

Rock Products

With which is
Incorporated

CEMENT and ENGINEERING NEWS

Founded
1896

Volume XXXVI

Chicago, November 25, 1933

Number 11

Recovery Progress—Trends

NEWS from Washington, D. C., fills most of this issue.

The Code of Fair Competition for the Crushed Stone, Sand and Gravel, and Slag Industries became law November 20.

Code hearings have been held for all the other rock product industries except Gypsum. The Code for the Cement Industry probably will have been signed by the President by the time this issue of ROCK PRODUCTS is off the press.

Highways

U. S. Public Works highway projects approved as of November 18 totaled 4,128, requiring expenditure of \$232,634,000. Contracts awarded were 3,103 projects; construction was in progress on 1,833 contract jobs and 472 day-labor jobs; 1,820 jobs were on Federal-aid highways systems into and through cities; 938 were extensions of Federal-aid highway systems, 1,202 were secondary roads; 168 projects in National parks, forests or public lands. Emphasis is placed upon the elimination of traffic hazards, such as of railway grade crossings, filling in unimproved gaps in the main highways, improvement of main routes through cities and development of highway feeders to railway and other transportation agencies. Other projects most desired are widening of road surfaces, construction of sidewalks, etc.

Civil Works Administration

The Civil Works Administration (CWA) was established November 15 by order of the President, taking \$400,000,000 from Public Works fund to provide immediate employment for 4,000,000 men and women now on relief rolls. Harry L. Hopkins,

Federal Relief Administrator, is now also Civil Works Administrator. Work to be done includes highway improvement; water-supply, sanitation, parks and playgrounds, land improvement, repair and maintenance of public buildings. Minimum wages are established at 40c per hour for unskilled labor and \$1 per hr. for skilled labor in the South, to 50c and \$1.20, respectively, in the North. Primarily intended to be spent directly for labor the rules allow 12½% to be spent for materials. Preference is to be given to locally produced materials so far as possible. All the money must be spent in 90 days from December 1.

Housing

On November 21 Public Works Administrator Ickes set aside \$100,000,000 of the Public Works fund for use of the Federal Emergency Housing Corporation, to be used for slum clearance in the big cities. About 20 large cities have already put in bids for shares.

The National Advisory Committee on Subsistence Homesteads has been organized to

spend \$25,000,000 of the Public Works fund for "demonstration projects." One project in West Virginia is already underway.

The Federal Farm Loan Bank Board has estimated a shortage of 800,000 homes and is busy chartering Federal Savings and Loan Associations throughout the country—already 86 have been approved. These Associations will finance new homes. The Home Owners Loan Corporation is helping ease the mortgage burdens of present home owners.

The United States Building and Loan League, an association of local building and loan associations, is pushing a plan before the Public Works Administration for use of some of its funds for home modernization.

Public Buildings

Contracts for new post offices and other Federal public buildings to the number of 389 will soon be let at a total estimated cost of nearly \$54,000,000. Local materials will be used so far as possible at the expense of Indiana limestone and other building stones hitherto popular for use on this type of government project.

Union vs. Ex-Service Men

On the verge of great expansion in public works projects, the construction industry is facing the old question involving ex-service men and union labor.

The United States Attorney General has ruled that Section 206 NIRA, providing that contractors shall give preference to the employment of ex-service men with dependents, does not prevent a union contractor from giving preference to union labor over non-union ex-service men with dependents. First, the ex-service man must be "qualified" for the job; second, if his conduct is obstructive

"We're in the army now!"



International News Photo

Rock Products

November 25, 1933

or has an obstructive effect, or even his employment has such effect, he is not really qualified. Thus a non-union ex-service man would not be qualified if his employment by the contractor tended to incite labor trouble with his union employees. Where a contractor had made agreements to employ only union labor prior to the passage of NIRA, he may stand on such agreements, except that he must give preference to union ex-service men.

State's Rights

State anti-trust laws still hold, according to a Philadelphia judge who ruled that a price fixing agreement in the cleaning and dyeing industry was against public policy. "Counsel for the complainant argued this agreement was in accordance with the policy of the NRA," he said. "A sufficient legal answer would be that Pennsylvania is still a sovereign State and that Congress has no power, nor has the President any power under a law of Congress, to declare the policy of Pennsylvania in such matters."

Employer vs. Employee

The Illinois Manufacturers Association sent a vigorous protest to the Federal Work Administrator against the wage rates established for relief projects, which rates were termed unduly high and calculated to defeat the object of the work relief program. The letter says 50 cents an hour for unskilled labor and \$1.20 for skilled labor will "seriously aggravate the unemployment situation."

Construction Labor Fights

The proposed master code for the construction industry threatens to be as difficult to work out as that of the bituminous coal industry. The American Federation of Labor is using all its influence to insist on uniform building trades wage scales which would about double scales now paid in many of the smaller towns and cities. Business men say such scales would eliminate all hope of reviving private building. The 30% outright gift of the Public Works Administration on non-Federal public works just about makes up the difference in cost on projects financed locally 70%, because of wage scales and hours imposed by PWA. At present 80% of the building trades are unemployed. Union labor opposes a master code for the construction industry; wants the industry broken up into units.

Charges Fly

On November 21 a controversy which has smoldered for several weeks was revealed in charges from organized labor that a group of powerful industrialists had combined to dominate the formation and administration of a series of important NRA codes. The organization under attack is the Machinery and Allied Products Institute, which has been engaged in negotiating NRA codes for some sixty or more member associations. Organized labor looks upon the Institute as a powerful combination seeking to dominate

the heavy industries without regard for the labor viewpoint. The Institute's view is that the problems of the capital goods industries are so inter-related that uniform treatment for all is desirable to avoid confusion.

A Crisis

The situation at Washington is summed up by the editor of *Engineering News-Record*: "Because of the indecision of the NRA, construction is at a crisis in its history. The unity of plan and action for which it has struggled during several years and which was nearly won by the energetic and conscientious work on the codes, is now becoming a more and more elusive prospect. The essence of the attack made against the codes by an unrepresentative minority of labor, abetted by small local groups of employers, in the desire to prevent and disrupt unity of the industry by defeating the basic code through which the whole industry is to be placed under harmonious plan and control. The details of these attacks—which include even rumored threats of a nation-wide strike if the code is approved—are of minor importance. The outstanding fact is that the opposition is directed against industrial unionization, and that the NRA is giving support and comfort to these hostile attempts by continued failure to act. The ultimate roots of the conflict now raging around the construction code extend far beyond the construction industry. They lie in the temporizing attitude which the NRA has maintained toward labor relations from the beginning—its obscure and conflicting statements on collective bargaining, its failure to define the duties and rights of individual employer or employee."

Cities Vote Bonds

Nearly all public-improvement bond issues voted on at November elections carried. San Francisco voted \$20,000,000 for water works and sewage disposal; Detroit voted \$87,854,000 for a rapid transit system of tunnels, subways and elevated railways. Port of Detroit authority was authorized to spend \$60,000,000 for harbor development. Columbus, Ohio, voted \$13,455,000 for sewage disposal plant, sewerage, bridges and other improvements. Camden, N. J., voted \$10,000,000 for an electric-power plant. Akron, Ohio, \$5,000,000 for various improvements. Hartford, Conn., \$3,500,000 for sewage treatment plant and sewers. And there are numerous others, making a total of nearly half a billion dollars.

Kansas Highway Bonds

By the time this issue goes to press the Kansas State Legislature will probably have passed a \$21,000,000 bond issue for highway construction. Also a former limit of 100 miles of concrete pavement per year has been already changed by the legislature to 600 miles per annum.

"Fired" by PWA

Secretary Ickes, Public Works Adminis-

trator, recently "fired" two subordinates, one in Tennessee and one in Iowa, for intimating to local authorities that probably the money they borrowed from PWA would not have to be repaid some time.

Codes Working

President Roosevelt announced on November 17 that the Iron and Steel Institute directors had voted unanimously to continue operation under the steel code, and he observed that this was evidence that a big industry had found NRA helpful. At the same time the White House let it be known that other big industries were ready to go ahead with their operations under NRA after the trial periods for their codes had expired. Lumber, oil and textiles were mentioned as industries that were finding the new system of self-government successful.

The lumber industry has a modified form of price fixing. The first minimum prices took effect October 9, and now most of the industry is on a minimum price basis. Because of the slack demand for lumber in this off-season, the minimum price is reported to have become largely the maximum also. To support this price structure, the code authority is empowered to allot production to the individuals mills. These allotments have been made. There are reported to have been only seven appeals from the allotments to the code authority, with two of these referred to NRA for settlement. In each case the code authority was upheld. The minimum prices represent some increase from the recent low levels, ranging upward from 15%. They are designed to curtail indiscriminate price cutting. The industry is not profit-making yet, but expects to be when demand improves.

The textile industry's code empowers the Government, through the Administrator of the Recovery Act, to limit the installation of new machinery. Already orders have been issued requiring that any new plant equipment can be installed only after issuance of a certificate of public convenience and necessity. This requirement is counted on to prevent the future draining of resources into over-development of production equipment.

Driven Out of Business

After nearly a hundred years of operations, J. Capps and Sons, Ltd., manufacturers of clothing at Jacksonville, Ill., has been forced to close its factory, throwing 386 persons out of employment, because of union demands on top of the NRA code, according to Robert M. Capps.

In a communication to the Illinois Manufacturers' Association just made public, Mr. Capps declared that after reducing working hours and increasing wages under the code, the company's labor costs had increased approximately 80%.

As a result of the increased costs under the code, Mr. Capps stated, the company's manufacturing costs in Jacksonville were higher than for corresponding quality in either Chicago or St. Louis, and "under the

Rock Products

code there is apparently no way by which this situation could be relieved."

Then came the representations of the union and the national labor board on September 16 and demanded that the company sign a closed shop agreement which the company declined, and on September 26 the stockholders voted to close the factory.

Not Compelled to Unionize

The New Jersey Court of Chancery, in a decision October 26, held that an employer operating an open shop was entitled to a preliminary injunction restraining a labor union from attempting to unionize his shop, from intimidating his employees, coercion, threats, annoyance or interference while going to and from their work. Previous relations between employer and employee had been friendly. The union could not invoke as justification NIRA, the court held, as the NIRA did not deprive an employer of the "right to conduct his business and deal with his employees without interference by intermeddlers such as organizers, strike agitators and the like."

Lime Case Thrown Out of Court

The suit for an injunction to restrain the City of Dallas from fulfilling a contract for water-works lime with the Dittlinger Lime Co., brought by a local lime manufacturer on the basis of the NRA code for the lime industry (see ROCK PRODUCTS, October 25, p. 44) has been thrown out of court. The court held it had no jurisdiction. The code had not been signed by the President when contract was made, and consequently was not effective.

No Sale

The Forest Service of the Department of Agriculture has announced that it recommended the rejection of all bids for 100 air compressors for use on trail construction and similar work by the Civilian Conservation Corps. The Forest Service said: "Twelve manufacturers whose bids on 100 air compressors for CCC work were opened yesterday (Wednesday) bid practically identical prices, 70% above prices paid by the Forest Service for the same equipment in recent purchases. The Forest Service refused to pay these high prices."

Backfire

Famed Section 7(a) of the National Recovery Act—the section that guarantees to labor the right to bargain collectively with representatives of its own choosing—now has come home to roost right in NRA headquarters.

When General Hugh Johnson, Administrator of the NRA, came back from his tour into the country where Section 7(a) is a very real problem, he found a budding union on his own doorstep. Handbills were flying around telling the several hundred workers that "now it is our turn for collective bargaining."

The NRA workers want shorter hours of

labor and higher pay. They claim that the 40-hour week is only a theory in this branch of the Government service, which has been engaged in enforcing the 40-hour week on industry. The workers argued that it was time to try out in practice the policy of a shorter work week.

Unifying Code Industries

The Cement Institute, the National Lime Association, and the National Slate Association are three of the 26 national industrial associations represented in the advisory committee of the National Industrial Council of the National Association of Manufacturers. The committee adopted a resolution to support sound policies on money, labor, industry and farming.

No Over-Rated Portable Plants

The Code of Fair Competition of Rock Crusher Manufacturing Industry, comprised of 17 makers of portable crushing and screening plants, was signed by the President November 2. Under this code it will be unlawful for a manufacturer to misrepresent his product—which certainly must include misrepresentation of capacity. Also sales must be made for not less than 25% cash.

Producers vs. Distributors

The code of fair competition for building supply dealers, which is now law, has been described by Col. John B. Rose, head of the industry's code authority, as a national attempt "to stop raids on the dealers' business by the manufacturers of the products the dealers sell." Any sale direct to the consumer by the producer, unless it be to the federal government, a state or a railway company, will be rigorously prosecuted by the dealers, it is announced.

Railway Buying

In order that they may make extra purchases of supplies and employ additional men during the winter and succeeding months, Chairman Jesse H. Jones recently announced that the board of directors of the Reconstruction Finance Corporation has reduced the interest rates on loans to railroads, including both new and existing loans, from 5% to 4% for a period of one year from November 1, 1933.

At about the same time leading manufacturers of railroad equipment announced that they are prepared to offer considerable resistance should any attempt be made to restrict profits or force lower their bidding for this type of business. After the extreme dearth in buying of the past few years they feel they are entitled to a reasonable profit on any orders placed. Some difficulty may be encountered over the question of what constitutes a "reasonable" profit. In the opinion of leading equipment manufacturers, a reasonable profit for them is one which would take into consideration the years of idle plant expenses which have piled up, the large losses in working capital of recent

years and the absence of an adequate return on their invested capital to stockholders of most of these companies.

Winter Construction

The Portland Cement Association is making a strong drive for a continuance of construction throughout the winter months. A particularly attractive circular has been broadcast. Floyd Gibbons has been employed to help over the N. B. C. radio network.

Chance to Kick at Price Jumps

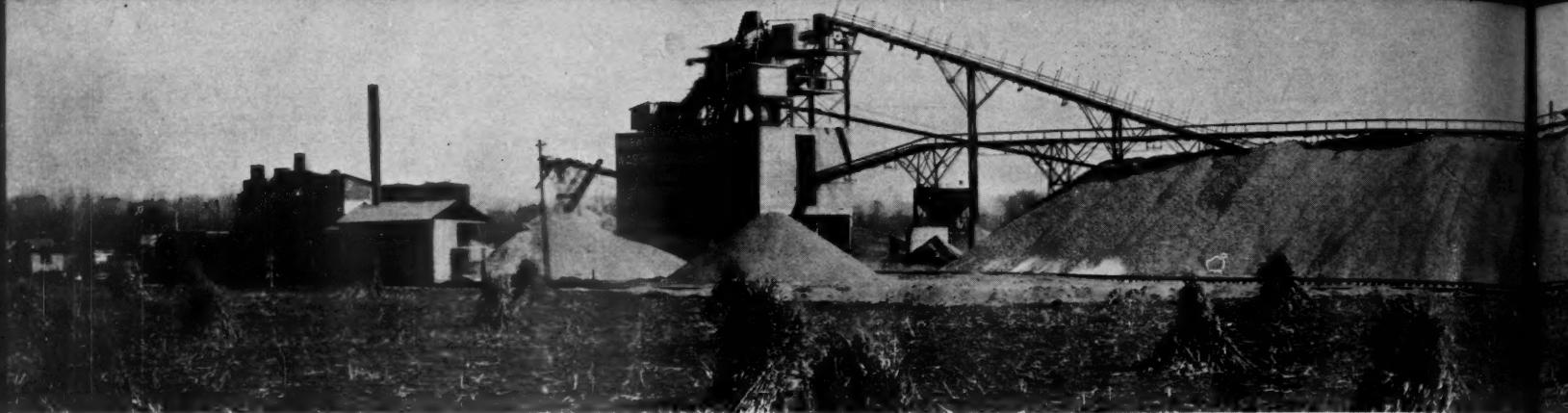
National Recovery Administrator Johnson has given notice of a public hearing to be held in the auditorium of the United States Chamber of Commerce Building, Washington, D. C., December 12, where any and all interested parties may submit evidence of price increases on the things they buy. The purpose is to establish the extent to which current prices may be justifiably attributed to the operations of industry and trade under their new codes of fair competition.

"RECOVERY PROGRESS — TRENDS" will be the lead feature of Rock Products from now on. The editor will appreciate the assistance of his readers in furnishing pertinent items, such for example as the two which follow below.

Hawkeye Portland Cement Co., Des Moines, Ia., has resumed operations, employing 300 laborers for approximately a month's work. Its opening will also afford work for some 300 coal miners since the cement company uses 400 tons of coal a day. General Manager C. B. Condon stated that there is no necessity for increasing the cement supply as the company now has on hand enough to fill orders for several months and operation at this time may cut short the time the plant will run in the summer, but workers need the income now possibly more than in the summer, the management believes.

♦ ♦ ♦

Marquette Cement Manufacturing Co., Chicago, Ill., has reduced production at Oglesby, Ill., 60%, but is "staggering" employment so as to care for the largest number of employees possible. Richard Moyle, vice-president in charge of operation, called a mass meeting of employees and explained the situation to be faced. Two alternatives, he said, were offered. First, it would continue running at full operation, but it would mean a complete shutdown of the plant by December 10, when all the store room would be filled. Second, operations would be reduced to 40% of capacity and employment would be rotated among as many men as possible. Both the company and the employees heartily endorsed the latter plan, for it offers employment to the majority throughout the winter.



Unusual plant layout designed to meet special requirements of Brewer and Brewer Sons, Inc., operations on extensive Ohio property

BREWER AND BREWER SONS, INC., Chillicothe, Ohio, put into operation during 1932 a gravel and sand preparation plant of unusual design which reaches a high point of flexibility and efficiency. The method used in reclaiming the raw material along with the continuous stock piling of raw material, at the base of mast, and car transportation to conveyor dump pit, are distinctive features. The use of "geared head" motors, also the methods used permitting the selectivity of blending and storage of materials together with other departures in general design, makes this an interesting plant.

The plant is located a short distance south of Chillicothe on farm land purchased by the Brewer company some years ago. The Scioto River cuts through the center of the farm and it is from a large bar in the river that the first gravel is being taken. Although the entire farm is underlaid with gravel, it was desired to use a reclaiming method that would be quite flexible. A slackline cableway with approximately 900 ft. span was used, allowing the excavated material to be piled on the ground at the base of the mast and as high as the mast would allow to dump. It was possible to double shift on this operation; of course, keeping ample material in this stock pile ahead of the ordinary plant production during the regular day run. This also tended to hold down the electric peak load demand by being able to use a much smaller slackline hoist motor, also any minor repairs could be made on slackline cableway without interrupting the flow of material to the plant. A 1½-cu. yd. Insley slackline cableway bucket was used and a Thomas hoist with General Electric motor operate the cableway. The steel mast was especially built from private designs.

From this stock pile a 1-cu. yd. Osgood shovel loads the material into a Western 10-

cu. yd. side-dump car (standard gauge) operated by a Plymouth 6-ton gasoline locomotive. This unit operates on a shuttle track—approximately 850 ft total length—from the raw material stock pile to the car dump on a grade of about 3%. Consequently the car and locomotive drift back to the stock pile by gravity.

The concrete, car-dump hopper has a capacity of approximately 20 cu. yd. of material and is covered with a heavy grill made with railroad rails spaced to allow 10-in. square openings for the rejection of oversize boulders. The material is fed from the hopper by a 24-in. Columbus conveyor-apron feeder to a 3-in. perforated plate grizzly. The oversize material is reduced by a 10-in. Telsmith primary gyratory crusher set to crush approximately 3 in. The fine material passing the grizzly and that reduced by the crusher is distributed on a 24-in. belt conveyor operating at 300 ft. per min. on 265 ft. centers and carrying the material to the top of the screening plant. The primary crusher is driven by a short flat belt by 25-hp. Allis-Chalmers motor mounted on a Kreitzer gravity tension type base.

The main 24-in. belt conveyor is mounted on all steel supports and the carrying rolls are equipped with Timken roller bearings having triple grease seals. These carriers are of the removable type. Return idlers also have Timken bearings. The main belt takeup is of the gravity type. Also proper safety guards and automatic back-up brakes—preventing return movement of the belt—are provided, together with motor control at top and bottom.

It was desired to eliminate to the greatest possible extent exposed gears, drive chains, sprockets and other superfluous transmission machinery and this was accomplished by using quite a number of "geared-head" motors. A 15-hp. Westinghouse geared-head

New Gravel Plant Ready of Flexibility in A

motor operates the main 24-in. belt conveyor. This unit has reduction features requiring only one set of single reduction gears in connection with the main head shaft of the conveyor, thereby making it a very efficient, clean, trouble-proof drive. Geared-head motors also were used on the sand drag tanks, conveyors and screen.

Washing Operation

At the end of the 24-in. main conveyor the gravel is discharged into a receiving "head-box" with a broad flume through which the material flows to a Morrow Manufacturing Co.'s 60 in. by 18 ft. combination scrubbing and sizing screen with a 72-in. diameter sand jacket. Also at the point where the material enters the head box, a 6-in. stream of water is introduced. The combination scrubbing and sizing screen is especially built, having a long scrubbing section with $\frac{3}{8}$ -in. holes throughout the scrubbing section except for the first 3 ft. This allows much of the soiled water, sand and other impurities to leave the mass of gravel. The gravel moves forward through the scrubbing and screening sections continually sprayed by clean water.

"Binks" sprays are used throughout in this plant on all water lines. This main combination scrubber and screening unit is placed approximately 20 ft. above the top of the concrete bins allowing sufficient headroom for proper dewatering chutes and gravity material flow to any point of the plant. The screen is driven by a 15-hp. Master geared-head motor through roller chain and gears.

The water supply is taken from a small tributary stream approximately 1,200 ft. from the plant by a Cameron single-stage





Plant Reaches High Point in All Branches

By Charles G. Milburn*

centrifugal pump driven by a 50-hp. General Electric motor through 10-in. main line the entire distance. This gives approximately 20-lb. water pressure at the extreme discharge point and is very satisfactory. The volume of water delivered is estimated at 1,200 gal. per min.

Crushing and "Blending" Operations

The oversize gravel passing the main revolving screen is passed to a Telsmith 40-in. gyratory reduction crusher. Also another Telsmith No. 32 reduction crusher is used "in group" with the 40-in. and other certain selected gravel is passed to the 32-in. crusher requiring a different ratio of reduction. Both of these crushers discharge into separate elevators and then on to separate vibrating screens, equipped with the necessary water sprays.

In connection with the 40-in. Telsmith crusher, a four-deck Telsmith vibrating screen is used. In connection with the 32-in. Telsmith crusher a three-deck Telsmith vibrating screen is used. The use of these two crushers and vibrators "in-group" allow a selectivity of different gravel sizes to be passed through either. Also the separate washing and screening operations allow taking off different sized materials as desired. The advantage of being able to "blend" the different crushed materials, holding them separate, or passing any portion back to the "round" gravel, is one of the features that make this practically a "100% selective" crushing plant as well as having the advantages of the ordinary gravel plant.

The reinforced-concrete bins were constructed practically as two separate four bin

units, with a center aisle, sufficiently large to allow the operation of two storage conveyors carrying materials in opposite directions from the plant. The "black top" or bituminous gravel-treatment plant is just beyond and parallel to the bins. The black top plant is placed on the side of the gravel plant where most of the crushed materials are stored and, as a result, it is merely a matter of gravity to supply the bituminous plant.

Loading

Car loading is done on one side only. Also the main switch track extends the full length of the storage piles and it is possible to load cars from various points with materials desired.

On the opposite side of the plant, "concrete road gravel" is placed on the ground in piles partially by gravity and is rehandled by a Koehring gasoline engine-powered crane into a Blaw-Knox triple weighing batcher. This leaves the two driving aisles underneath the plant, for regular "job" truck haulage and segregates all of the different operations so that there is practically no interference. Loading operations can be carried on at various points simultaneously without any interference.

Storage

One 18-in. storage conveyor operates on 400-ft. centers and is fitted with a self-propelled traveling tripper. This tripper dis-

*Milburn Machinery Co., Columbus, Ohio.

charges from a height of 35 ft. This 400-ft. conveyor is driven by a 10-hp. master geared-head motor through single-reduction gears. The short storage conveyor is also 18-in. operated on 99-ft. centers and is also driven by a 5-hp. Master geared-head electric motor unit.

Present storage arrangements provide for about 24,000 tons; making it possible to close the plant for winter periods, not to mention advantages of storage during peak season demands.

Power Saving

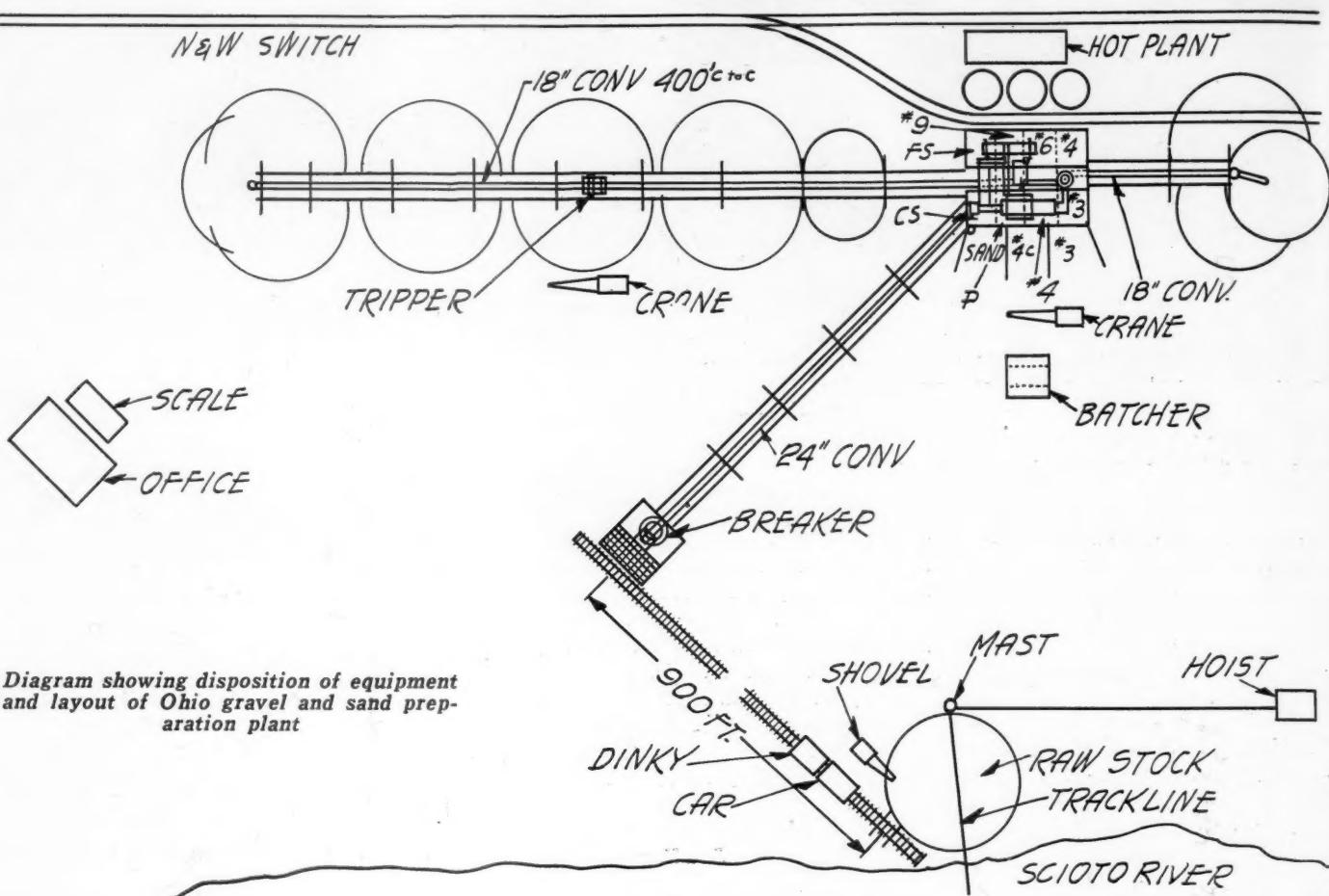
Also, during the past winter, it has been possible for the Brewer company to operate their repair shop, electric motors and lights for overhauling contracting machinery and motor trucks and hold the current consumption within the electric company's "stand-by" winter charges. This also allows for lighting around the premises. This feature represents a great saving and is made possible by the material storage arrangements—making it possible to serve trade from storage during these winter months, without operating the main plant.

In order to provide ample space for stock piles, the main feeding conveyor from the car dump was placed on an angle 45 deg. from the north and south center line. A 20-ton Winslow scale is located at the office near the plant used for weighing out truck shipments.

The company owns and operates a fleet of 25 trucks.

In every case, all machinery units, motors, etc., demonstrated their ability to easily carry the rated plant capacity of approximately 100 tons per hour. From 10 to 13 men are required to operate the plant at capacity, also

View of Scioto River and general terrain adjacent to sand and gravel preparation plant of Brewer and Brewer Sons, Inc., located near Chillicothe, Ohio



a total of 245 hp. connected load is installed and the load factor is very satisfactory.

Personnel

The main offices of Brewer and Brewer Sons, Inc., are located on West Water street, Chillicothe, Ohio. The officers of the com-

pany are W. O. Brewer, president; C. P. Brewer, vice-president, and F. A. Brewer, secretary.

The plant was designed and built under the direction of the author.

The rotary scrubber and screen, sand tanks, elevators, steel structure (above the bins)

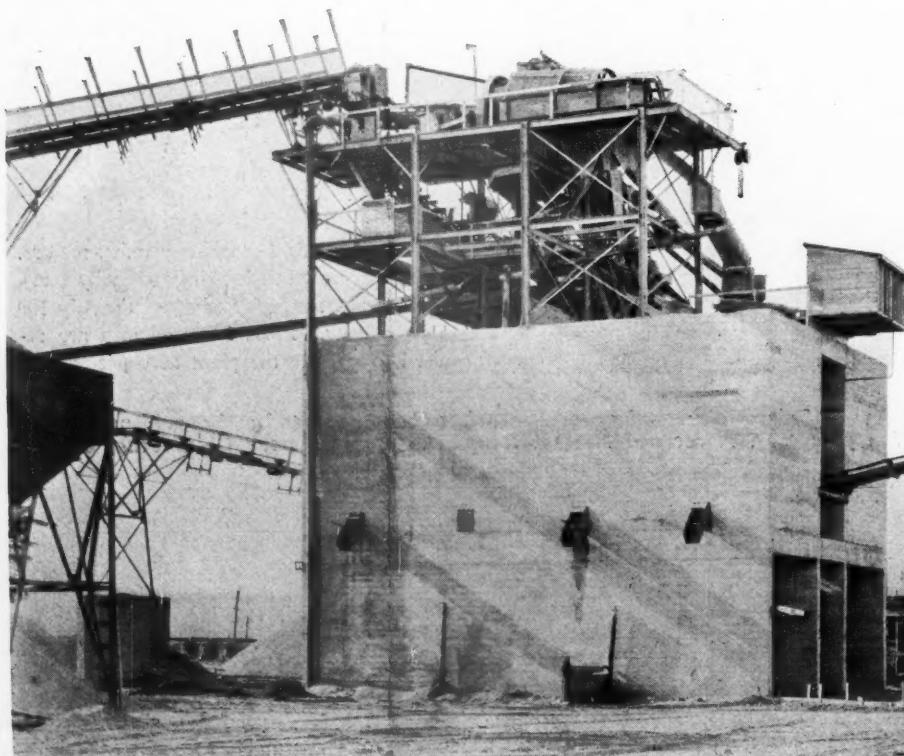
were fabricated by Morrow Manufacturing Co., Wellston, Ohio.

The Columbus Conveyor Co., Columbus, Ohio, furnished the belt conveyors, steel conveyor supports and apron feeders, also tripper.

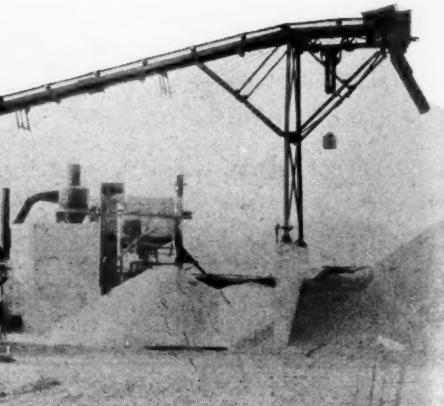
Conveyor belt was furnished by Boston Woven Hose and Rubber Co.

Macwhyte wire rope used on slackline cableway.

The plant is located on the Norfolk & Western Railroad and electric power is furnished by Southern Ohio Electric Co.



Stock handling plant of Brewer and Brewer Sons, Inc.



Rock Products News Briefs

Cement

The Federal Trade Commission has issued its full report (Senate Document No. 71) in response to U. S. Senate Resolution No. 448 ordering an investigation of competitive conditions in the cement industry. A summary of the conclusions of this report were published in *ROCK PRODUCTS*, August 25, p. 80. The whole report is a booklet of 160 pages and might well be entitled "The Technique of Price-Cutting." The commission's investigators rifled the files of producers, dealers, railway companies, state highway departments, contractors, etc., and have included excerpts of "confidential" communications that throw much light on the art of price-cutting and the attempts to meet the situation that developed in the cement industry from 1929 to 1932. Names, dates, persons and companies are mentioned, and the "story" is interesting but not particularly edifying. The report, published at this time, when the industry is attempting by means of an NRA code to correct some of these weaknesses really should prove helpful; for the Federal government itself has thus demonstrated their existence.

◆ ◆ ◆

Albert Y. Gowen, former vice-president of the Lehigh Portland Cement Co., is now a full-fledged Englishman, according to *Anglo-American Trade*. He has been elected managing director of the Alpha Cement Co., Ltd., Lewes, England. This company was formerly the Cement Industries, Ltd.

◆ ◆ ◆

British Columbia cement manufacturers are complaining to the Victoria, B. C., Chamber of Commerce against imports of British cement. It is stated that approximately 18,000 tons of cement manufactured in the United Kingdom are now afloat and destined for British Columbia ports and are being entered under the inter-Empire agreements sanctioned at the last Imperial Economic Conference at Ottawa. The report to the Chamber of Commerce here mentions the freight rate on cement from British ports to Vancouver as \$3.75 per ton, while the rate from Victoria to Vancouver is \$2.50 per ton. It is estimated in trade circles that the United Kingdom manufacturers are maintaining the price level in the Old Country by exporting surplus production to Canada, taking advantage of the low cost of transportation.

◆ ◆ ◆

Santa Cruz Portland Cement Co., San Francisco, Calif., has filed an answer to the suit of the Pacific Portland Cement Co. to prevent the Golden Gate Bridge and Highway District from changing the cement used on the bridge piers and fenders from standard portland to the high silica ("pink") cement claimed to be made exclusively by the

Santa Cruz company (see *ROCK PRODUCTS*, September 25, p. 50, and October 25, p. 48). The answer contends that the Pacific Portland Cement Co. has no contract with the bridge district, but only with the Pacific Coast Aggregates, Inc., which in turn has a contract for mixing and placing the concrete with the Pacific Bridge Co., the bridge contractor. It is contended that under the terms of the bridge district's contract with the Pacific Bridge Co., the chief engineer of the bridge district "can at any time vary, increase or diminish the character, quantity or quality of any of the work and at his option require the use of any kind of hydraulic cement." The high-silica cement, the answer goes on, has been found by the engineers to be "better adapted for use in under-water construction than portland cement, for the reason that it will better withstand the deteriorating effects of the ocean water in which 106 ft. of the San Francisco pier will be continuously submerged." George T. Cameron, president of the Santa Cruz company, who is also a director of the bridge district, declares that he never had any personal interest in this or any other matter with which the district is concerned. On the contrary, the answer says, "his interest and his only interest is to see that the bridge is constructed of such materials as are best adapted to suffer the enormous strains and stresses to which the bridge will be subjected."

He makes a vigorous denial that there was any agreement between Pacific Coast Aggregates, Inc., and the Santa Cruz company prior to change in specifications in the Board, and states that it was made in the "normal and regular course of business." The answer also denies that the Santa Cruz Portland Cement Co. has or ever had a monopoly of high-silica cement.

◆ ◆ ◆

P. C. A. Elects Geo. F. Coffin

Chairman of Board

GEORGE F. COFFIN, treasurer and general manager, Nazareth Cement Co., Easton, Penn., was elected chairman of the board of directors of the Portland Cement Association at the annual meeting held in Chicago, November 20-22.

B. F. Affleck, president, Universal Atlas Cement Co., Chicago, was elected treasurer and S. W. Storey, vice-president, Trinity Portland Cement Co., Chicago, a member of the board of directors.

Edward J. Mehren was re-elected president and William M. Kinney, vice-president and general manager.

It was stated at the meeting that the fear of building with concrete in winter months is holding back much construction. The association is arranging to place in the hands of interested public officials and private citi-

zens full information on using concrete in cold weather.

◆ ◆ ◆

Statistics of the U. S. Bureau of Mines show that the Portland cement industry in October, 1933, produced 5,037,000 bbl., shipped 6,750,000 bbl. from the mills, and had in stock at the end of the month 19,503,000 bbl. Production of portland cement in October, 1933, showed a decrease of 36.6% and shipments a decrease of 22.8%, as compared with October, 1932. Portland cement stocks at mills were 14.2% higher than a year ago. The mill value of the shipments—49,135,000 bbl.—in the first nine months of 1933 is estimated as \$62,649,000. In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 163 plants at the close of October, 1933, and of 165 plants at the close of October, 1932.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	October	Sept.	Aug.	July	
	1932	1933	1933	1933	1933
The month.....	34.6	22.1	25.5	35.9	37.6
The 12 mos. ended	29.6	24.5	25.5	26.5	26.3

◆ ◆ ◆

Crushed Stone

Ladd Lime and Stone Co., Cartersville, Ga., Lester J. Backus, president and general manager, recently received a 10,000-ton order from the state highway department because of ingenuity used in developing a cure for skidding on asphalt-treated roads.

This order resulted from successful experiments carried out on the road surface at the bridge over the Etowah river. Time and again, wrecks occurred at the bridge, and the highway people tried out the top-surfacing material offered them by the Ladd plant. Results have been so satisfactory, the initial order for the 10,000 tons came through a few days ago. Already, the material is being placed on the present roadbed, on the Kingston-Rome branch of the Dixie Highway. Later, the same treatment will be used on the branch leading toward Dalton and the Tennessee line. Experts have found that asphalt surface on the highways are satisfactory in dry weather, but in wet weather they are treacherous in the extreme. It is with the idea of curing this defect, that the top-surface is now going down.

◆ ◆ ◆

Columbia Quarry Co., St. Louis, Mo., has opened up a new quarry at Chester, Ill., to fill a large U. S. Government contract for rip rap for river protection work. The property was purchased several years ago in anticipation of river development work. The company has built its own dock and loading wharf and is in a position to make river shipments of stone for any purpose.

Economics of Blast Hole Drill Operation

By Horace K. Church*

THE percussion or cable type of drill is more commonly known as the well drill or churn drill. This article deals with the factors which affect the unit cost of drilling with this type of drill. By unit cost is meant the cost of drilling per ton of rock. It is the quotient obtained by dividing the average daily cost of operation of the drill by the average daily tonnage of rock drilled. After arriving at an average figure for the daily cost of operation of a blast hole drill, the factors which affect the average daily rate of drilling in tons per day will be discussed.

Costs

Blast-hole drilling is an operation which calls for no materials, with the exception of repairs and replacements to drill, drill steel, and drilling cable. By reason of this the unit cost is almost inversely proportional to the rate of production. In other words, in a given quarry the daily operating expenses of the drill are practically a constant and if the rate of production in tons of rock drilled per day increases we may expect the unit cost of drilling per ton of rock to decrease in the same proportion.

Daily Cost of Operation

For the latest type of blast-hole drill, embodying such features as all steel construction, chain drive, wire drilling cable, and full crawler mounting the annual fixed charge in the average quarry might be:

Initial cost of drill complete with drill steel	\$4,000
<hr/>	
Annual charge	
Per cent initial cost	Dollars
Depreciation, with life of ten years	10.0 \$ 400
Interest	6.0 240
Taxes	0.5 20
Repairs and replacements....	3.0 120
Drill steel repairs and replacements	5.5 220
<hr/>	
Totals	25.0 \$1,000

Assuming 250 working days of eight hours each per year, the daily allowance for fixed charges becomes \$4.

Assuming average wage scales, fuel costs, cable costs, and bit dressing costs to obtain, the total daily operating expense becomes:

Dollars	
Daily fixed charge.....	\$ 4.00
10 gal. gasoline and 1 qt. oil.....	1.70
Driller's wage	5.00
Helper's wage (one helper to two drills)	1.50
Allowance for blacksmith's wage, blacksmith shop expenses, water supply, etc.	7.50
Cable—150 ft. length; \$24.70 cost; 400 hours life; 8 hour day.....	.49
<hr/>	
Total	\$20.19

NOTE: All elements of the above analysis are, of course, subject to changes suiting them to the individual quarry. The analysis is believed to represent average conditions.



Example of a modern blast hole drill of the cable percussion type. As contrasted with old-fashioned drills, the features are all-steel construction, chain drives throughout, wire rope drilling cable, and full crawler mounting

Daily Tonnage Drilled

The daily tonnage drilled depends upon two factors. They are the average footage of hole drilled per day and the spacing of the holes.

Feet of Hole Per Day—The first factor, and that which receives most attention from drillers and drill foremen, is the daily production in terms of feet of hole drilled per day. Three influences must be considered in a discussion of this factor. These influences in order of their importance are:

- (1) The nature or kind of rock and the physical condition of the rock.
- (2) The skill, resourcefulness and experience of the driller.
- (3) The avoidable and unavoidable delays to the drilling operation.

Nature and Physical Condition of Rock—By nature is meant the kind of rock. Other things being equal the rate of drilling will depend upon the hardness, the toughness, the abrasiveness, and the sludging characteristic of the rock. It was in an effort to increase the rate of drilling in a material of any

*Research Engineer, Keystone Driller Company, Beaver Falls, Pa.

given characteristics that the modern blast-hole drill was developed.

The relationship of the above rock characteristics to the characteristics of the modern blast-hole drill is emphasized in the following discussion.

Modern Rig and "Drilling on Spring of Line"

The function of a blast-hole drill is to perform work on rock and the amount of work which it does is measured by the lineal feet of hole which it drills per unit of time. The rate of drilling ought to bear a relationship to the rate of energy delivery of the machine. The rate of energy delivery is the product of four factors:

- (1) The weight of the drill steel in pounds.
- (2) The length of the stroke in feet.
- (3) The frequency of the stroke in strokes per minute.
- (4) A factor which represents the efficiency of the blow of the falling tools striking the rock as compared to the blow of an elastic free falling body striking an elastic surface.

It was in an effort to combine these four factors properly that the modern rig with wire drilling cable and smart acting walking beams was designed. Drillers maintain, and rightly so, that the most effective drilling with a manila line is done "on the spring (or stretch) of the line." There are two reasons. They desire to operate the machine as fast as possible under the given conditions. They do not want to shake the drill to pieces. With these two practical objectives they secure the highest average daily rate of drilling. However, in drilling on the spring of the line they sacrifice one important factor—the free fall of the tools. They must sacrifice this factor in order to get the tools away from the bottom of the hole without excessive vibration in the machine and without delay. In the very latest types of machines much better advantage is taken of the principle of the free fall of tools by the use of wire drilling line and by walking beams especially designed for this purpose than in old equipment.

Recently the writer compared several machines of the older type with a modern machine on this basis. All the rigs were drilling in the same material (a hard trap rock) using the same type of machine dressed bit, and the same tool weight. Each rig was observed for more than 100 hours of exclusive drilling. By exclusive drilling is meant the time spent on actual drilling, after the elimination of all delays, as this was essential to a fair comparison. Tabulations and results follow:

	Old machine	Modern machine
Drilling line.....	1 1/4 in. man	3/4 in. wire
Walking beam action	Sluggish	Smart
Weight of drill steel, complete....	1,350 lb.	1,350 lb.
Length of stroke at hole	30 in.	37 in.
Frequency of strokes per minute.....	47	53
Gross energy delivery, foot-pounds per minute.....	159,000	221,000
Rate of drilling, feet per minute...	0.0163	0.0339
Feet of hole drilled per million foot-pounds of energy.	0.102	0.153
(A) Efficiency advantage of the modern rig by reason of wire rope cable and walking beam action, neglecting the personal element of operator.....	50%	
(B) Total advantage of the modern rig by virtue of longer stroke and greater frequency, plus factors included under (A)	108%	

Tied up in this 50% advantage of the modern rig is, as stated above, the personal element of the operator. However, the modern rig requires the operator to be "on his toes."

The Modern Rig and the Operator

It has been stated that manila line will apologize for a poor driller but that a wire rope will not. The statement is well phrased. The ideal method of drilling is to pay out the drilling cable in short and uniform (and steady) increments, that is, to maintain exactly the most advantageous "striking tension" in the cable. The tendency of a driller using manila line is to neglect the payout of the drilling line. He can afford to do this because the stretching property of the manila line is such as to compensate to a great extent for the increasing depth of the hole. Of course, the driller is sacrificing the impact blow which is being absorbed in the stretching of the line.

When a wire rope is used the driller must pay out the line in the proper manner, because the machine is quick to warn him when tools

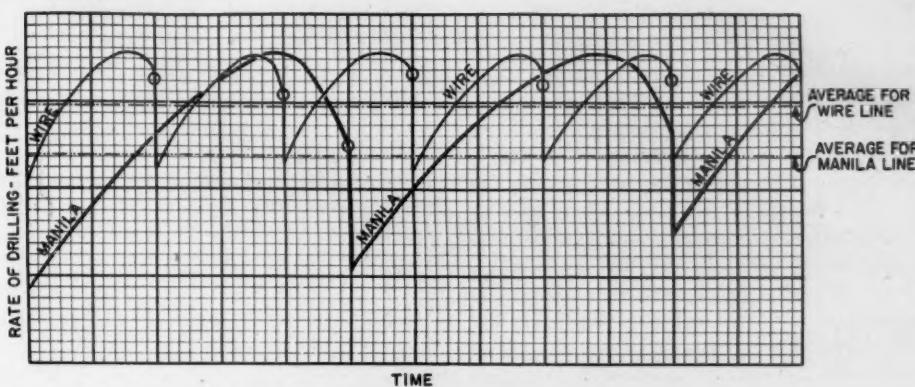


Diagram illustrates what experienced wire line drillers believe to account largely for the fact that one can "make hole" faster, on the average, with wire line, properly fed. It should be noted that the maximum attainable rate of "making hole" with wire and manila line, under identical conditions, is the same, but the minimum speed is lower with manila. Distance drilled between successive feedings of line being assumed to be three times greater with manila line, there is a greater drop of drilling progress following each feeding, and the average rate of progress is therefore lower. Feeding is indicated by o, and the rate of speed in feet per hour is observed in the curves to drop sharply after each feeding. Actual experience indicates that this drop will vary somewhat in proportion to the amount of line paid out each time

tend to be off bottom. Shock absorbers "bottom" and the rig vibrates because of the rigidity of the drill cable. Thus the construction of the modern blast hole drill requires the driller to be more alert—always a dollar-saving quality in a driller.

In the case cited above, the modern drill, by virtue of simply increased length of stroke, increased frequency, smart acting walking beams, and wire drilling line, increased the rate of drilling by 108%. It is also important to note that two factors which at first blush would appear quite trivial, were instrumental in greatly augmenting the energy delivered per unit of time. We refer to the stepping up, with the modern machine, of the length of stroke by only 7 in., and of the speed by merely 6 strokes per minute. Trifling as these increases appear, they are responsible for raising the foot-pound per minute by 39%, or from 159,000 to 221,000. It brings home the fact that very small in-

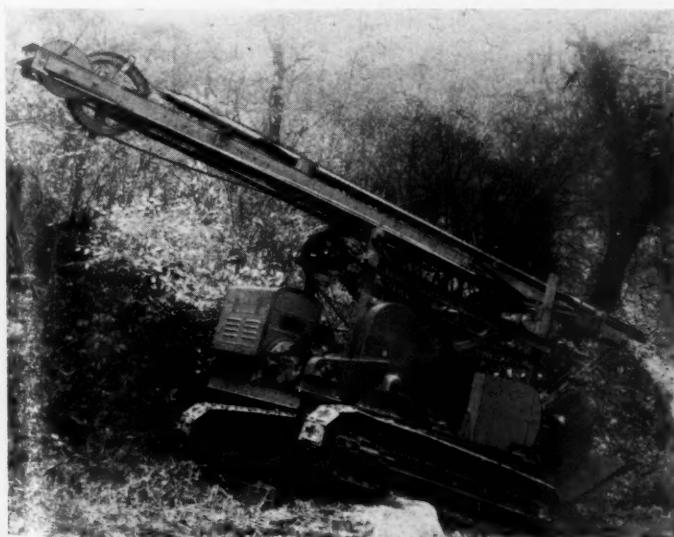
creases in length and speed of stroke are equivalent in effect to relatively big increases in tool weight. If tool weight had been increased, as it might easily have been, the advantage would have been even greater.

Returning to the subject of the nature of the rock, it is apparent that in a given quarry of given material, with given rigs, whether old fashioned or modern, with given drillers, and with given physical condition of rock, one may expect a definite attainable rate of drilling. This attainable rate of drilling is reached only by the most alert drillers working with the smallest possible amount of avoidable delays.

By physical condition of the rock is meant those characteristics such as seams, fissures, cavities, faults, dips, wetness, etc., which determine the time losses in drilling which must be attributed to caving of the hole, sticking of the bit, deflection of the drill steel, and other delays incident to a normal day of operation. They are delays which can hardly be evaluated in terms of time, such as the periodic tightening of the drill cable to compensate for a slight caving and the quick use of the jars in the event of sticking. Thus the nature and the physical condition of the rock determine what might be called the "exclusive rate of drilling," as already defined. It is the rate at which the foreman should aim in order to keep unit cost of drilling to a minimum.

Skill, Resourcefulness and Experience of Driller

There are few operations in construction and manufacturing which call for as much downright "Yankee ingenuity" as drilling. And it is largely because one cannot see what is going on down in the hole. One must feel. There is, and has been, a pronounced tendency to pay skilled drillers the



Modern full-crawler-mounted drilling unit easily negotiates rocky grades

Rock Products

November 25, 1933

wages of common labor. It is very probable that this tendency has discouraged the skilled drillers to the extent that they are not particularly interested in turning in a day's work comparable to the possibilities of the drill machine. The writer does not want to criticise quarry operators in their policy, because competition has forced many men to do what conscience forbade, but he does want to emphasize the point that a driller's wage is approximately one-fourth the cost of drill operation, and that if the driller's wage is cut 25% and daily production is cut an equal percentage thereby, the result is higher cost per ton of rock drilled.

Avoidable and Unavoidable Delays

Like other construction operations drilling has its avoidable and its unavoidable delays which lower the exclusive rate of drilling. Avoidable delays are defined as those delays which can be eliminated by good management. Unavoidable delays, as the adjective indicates, cannot be entirely eliminated by good management, although many of them can be large or small, depending on operator's skill and good management. A discussion follows:

Avoidable Delays are mainly as outlined in the following:

(1) When moving requires more than an hour, the shutdown of the drill while the driller acts as a laborer and prepares the setup, cribbing and necessary digging, for the next hole.

(2) Assisting the next driller to perform any operation which requires more than one man, such as changing a bit and moving. This delay, as well as the first, characterizes operation in quarries without driller's helpers.

(3) Waiting for casing, bits, or other tools and equipment, which should have been delivered promptly at the drill. This includes waiting for common fishing tools which should be available every hour of the day.

(4) Undue loss of time chargeable to the driller.

(5) When holes are sprung, the shutdown of the drill while waiting too long for powder men to perform the springing.

(6) Excessive time spent in moving machine.

Unavoidable Delays:

(1) Bailing and changing bits. These two delays are properly a part of actual drilling time because they are more particularly a part of the actual drilling operation. In other words, one cannot drill without bailing and changing bits.

(2) Casing hole and adjusting casing.

(3) Moving machine.

(4) Rain.

(5) Repairs to machine.

(6) Splice rope.

(7) Drill steel stuck.

(8) Move for blast.

(9) Change ropes.

(10) Power off.

(11) Fishing.

(12) Lost hole.

- (13) Adjust rope on drum of machine.
- (14) Springing.
- (15) Redrilling after springing.
- (16) Unavoidable operator's lost time.

The Modern Rig and Full Crawlers

Before discussing the influence of delays upon unit costs, the dollars and cents value of full crawlers should be considered. Let us assume that operation in a given quarry calls for a move every other day and that the present machines with traction rear wheels and long wheel bases require two hours for the move. A full crawler mounted machine by reason of its shorter wheel base and greater mobility can easily save an hour in moving, considering also the placement of cribbing. Is the quarry operator justified in spending an additional \$1,000 for the full crawler mounted machine?

Assuming, as in the cost analysis already given, the annual fixed charge is 25% of the initial investment per 250 working days, the additional cost per day for the crawler feature would be \$1.00 (\$1,000 times 25% divided by 250). Thus for one move in two days it would cost \$2.00 with a saving of one hour. According to the cost analysis, an hour of drill time is worth \$2.50. Thus a saving of \$0.50 is effected for every move, amounting to \$125 per year (if the machine is moved every other day) by the selection of a full crawler-mounted, blast-hole drill.

Example of Cost of Avoidable Delays

In a trap rock quarry believed to be fairly representative several sources of delay were noted, which might easily have been eliminated. Drills were operated within a hundred feet of each other and the drillers had no helpers. Bits were exchanged about every six hours and the rigs required considerable cribbing in setting up. It was the practice to shut down a drill whenever the adjacent driller required help in changing a bit, moving, or in any other operation requiring more than one man. It required 268.4 hours to drill, spring and redrill a hole, and move and set up for the next hole. Of these hours, 5.5 were spent in assisting the next driller to change bits and 40 hours were spent in assisting the men in erecting the cribbing and preparing for the next hole; during that 40 hours the driller shut down his rig and acted as a laborer. In all 45.5 hours made up the avoidable delays—avoidable because the hiring of a driller's helper and the erection of cribbing for the drill setup beforehand would have saved the lost time.

The actual distribution of time and the attainable distribution with good management, together with the possible unit saving are outlined below:

	Attainable Actual able hours hours
Drilling time, exclusive of all delays	128.1 128.1
Delays:	
(a) Avoidable—	
Assisting next driller in changing bits	5.5

Assisting workmen in erecting cribbing for next hole.....	40.0
(b) Unavoidable—	
Bailing	12.7
Changing bits	4.8
Casing hole and adjusting casing	4.3
Springing hole and redrilling	16.5
Moving	17.5
Springing hole to straighten and redrilling	39.0
Total delays	140.3
Total available drilling time for drilling one hole.....	268.4
Possible saving in time through the elimination of avoidable delays	45.5
Possible net saving in dollars. Time saved evaluated at \$2.10 per hour, the difference between the value of an hour of drill time and the value of an hour of helper's time.....	\$95.55
Depth of hole drilled, feet.....	117
Possible saving per foot of hole.....	\$ 0.82
Tons of stone per foot of hole.....	42
Possible saving per ton of stone.....	\$ 0.02

In the above analysis emphasis has been placed upon the expense of the very obvious delays. Another source of delay is the unnecessary time consumed in those operations which have been classified as unavoidable delays. The elimination of these delays is an individual problem for the driller. The management's responsibility in this respect is confined to the hiring of efficient drillers.

Examples of possibilities for savings by the efficient handling of the unavoidable delays are:

- (1) Keeping bits as near to the machine as possible so that no time will be lost in the changing.
- (2) Keeping a good supply of various length casing on top of the quarry.
- (3) Complete preparation of next drill setup, including cribbing, before the beginning of the moving operation.
- (4) Systematic planning of drilling and blasting operations in order to make drilling as continuous an operation as possible.
- (5) Keeping a set of the most common fishing tools available for instant use, including short stem and long stroke fishing jars.
- (6) Since the overall rate of drilling, average footage over a period of time, depends to a great extent upon the driller himself, a just reward for his efforts to decrease delays and to increase footage.

(7) After careful determination of when and how much to bail for maximum production, the insistence that drillers hold to a definite schedule of bailing. If this operation has been given proper attention it will be found that both actual time is saved and actual rate of drilling increased. One quarry carries the rule further and insists on bit changing after a definite period of drilling.

One must always bear in mind that the unavoidable delays, taken collectively, are much more significant than the avoidable delays. In the case cited previously the avoidable delays total 45.5 hours and the unavoidable delays total 94.8 hours. If, by careful

attention, the unavoidable delays had been reduced only 25%, the net saving would have been almost \$60.

Tons of Stone Per Day

The second factor which affects the unit cost of drilling, and that which receives most attention from superintendents and explosives engineers, is the daily production in terms of tons of rock drilled. If the lineal rate of drilling, feet of hole per day, is a constant, then the cubic rate of drilling, or tons of rock per day, depends on the spacing of the holes.

Circumstances peculiar to each quarry determine the economical spacing of the holes. These three circumstances are outlined below.

(1) Height of Face or Breast:

As the height of face increases the spacing of the holes increases. This is explained by the following discussion. As a general rule explosives are loaded to within a fixed distance of the top of the hole in a given material. At the same time the yield, or figure for tons of rock per pound of explosive, is about constant in a given material. As the height of face increases it follows that the holes must be moved back from the face in order to give each pound of explosive the same amount of work to do in terms of tons of rock per pound of explosive and in order to keep the top of the column of explosive the same distance below the surface of the ground. And as the distance back from the face, or burden, is increased, the longitudinal distance, or spacing, between the holes is also increased. Another factor which permits of increased spacing is the fact that gravity fall, as well as explosive action, produces fragmentation in high faces.

(2) Kind of Material:

Hard rocks, generally igneous, require closer spacing than soft rocks, generally sedimentary. This is explained by the tendency of the hard rocks to resist fragmentation. However, too much emphasis should not be placed upon the influence of the kind of material, since in practice the physical condition of the material largely determines the spacing of the holes.

(3) Condition of Material:

Physical features of the rock, such as thickness of beds, fissures, seams, pockets, etc., which tend to limit the effective reach of the explosives generally reduce the possible spacing. This is particularly true in seamed and pocketed clay bearing limestone. Conversely, in thinly bedded friable material which requires only a good shaking up to produce satisfactory fragmentation, the hole spacing can be increased greatly.

At present there is a tendency, especially in the trap rock quarries, to make the spacing of the holes a function of the diameter of the hole. It seems to the writer that this is putting the cart before the horse and that diameter of blast hole should be dependent upon the practical spacing of the holes, as limited by the three considerations cited above. In other words, the drilling machine

is subordinated to nature's requirements rather than the reverse. We now have two schools of thought on this subject of size of blast holes. They are the 6-in. hole advocates and the "vertical tunnel" advocates. There are merits to both schools' arguments and the writer believes that there is a proper sphere for both 6-in. holes and vertical tunnels. It is not the purpose of this article to discuss this subject at length. Suffice it to say that:

(1) In the average quarry, producing crushed sedimentary rock such as limestone and sandstone, natural conditions limit the operator to the use of 6-in. holes. It is interesting to note that 87% of the crushed stone produced in the United States in 1931 came from limestone and sandstone quarries. The operator is limited to 6-in. holes because they will carry enough explosive to produce satisfactory fragmentation in the maximum practicable hole spacing.

(2) In the remaining quarries producing 13% of the nation's stone, hard rock of igneous origin, consisting principally of traps and granites, it should be the policy of the operator to select the maximum spacing consistent with satisfactory fragmentation and determine hole diameter on that basis.

In all cases drilling and blasting are figuratively one operation. The purpose of primary drilling is to place holes of suitable diameter on such centers as to fragment rock to such a degree as to reduce secondary drilling and blasting to a minimum. In regard to spacing, there are a few axioms which may be cited:

(1) Spacing increases as the height of the face increases.

(2) Holes should be located with due regard to seams and other natural features of the rock.

(3) The harder and tougher the rock and the more solid the formation, the closer must be the spacing.

(4) Other factors being equal, the greater the distance between the holes, the lower the unit cost of drilling.

(5) Economies resulting from lower unit cost of primary drilling and blasting may be more than offset by increased unit cost of secondary drilling and blasting caused by poor fragmentation.

A Well-Managed Drill Crew

In order to illustrate just what can be done by good management there is submitted below a summary of operations studied by the Division of Management, U. S. Bureau of Public Roads, Washington, D. C. T. Warren Allen, chief of the division, very kindly furnished the analysis. Quoting:

"The first of these studies relates to a fairly large commercial quarry producing crushed stone for highway and general construction purposes. The material was granite having an average crushing strength of 14,000 lb. per sq. in., a French coefficient of abrasion of about 12.5, and a weight of 164 lb. per cu. ft. The 6-in. well drill was

provided with a 4½-in. by 22-ft. stem, 150-lb. straight chisel edge bits, 2-in. manila rope, and powered with a 15-hp. slip-ring variable speed motor. Drill bits were changed regularly every 8 ft. and this operation consumed an average of 15 minutes for each change. The average rate of drilling was 2.10 ft. per hour of net operating time or 2.24 ft. per hour of actual operating time.

On this quarry out of a total of 3,375 available hours for drilling, 421 hours were lost in all major delays other than changing bits. These time losses were due to the following causes:

Cause	Hours lost	Percentage of available time
Moving machine	224.5	6.65
Rain	520	15.4
Repairs to machine	46.0	1.36
Splice rope	35.5	1.05
Prepare place to drill	19.0	0.56
Drill stuck	17.0	0.50
Move for blast	11.0	0.33
Exchange ropes	9.0	0.27
Power off	7.0	0.21
Totals	421.0	12.47

During this time a total of 6,203 ft. of hole, each about 70 ft. in depth, were drilled. This gives an average rate of 2.10 ft. per hour. All holes were drilled to about 5 ft. below the quarry floor.

NOTE: Time of bailing as well as changing bits was included in the net time of operation, since bailing and changing bits are really part of actual drilling time. Thus the drill crew operated at an efficiency of about 88% during 3,375 available hours of drilling time. Noteworthy is the fact that not a single example of an avoidable delay shows up in the analysis.

Conclusion

Drilling on top of the quarry, "upstairs" as it were, should not be considered as a necessary evil but as part of a continuous manufacturing process—the production of crushed stone. The operation of drilling is characterized by many variables imposed by nature, but it is an operation which can be analyzed and in which economies can be effected through analysis. New modern blast-hole drills will help greatly to reduce the quarry's unit costs, and more efficient planning and operation of all equipment, new or old, will also contribute toward the same end.

Gypsum to China

STANDARD GYPSUM CO., San Francisco, Calif., recently made shipments of almost 10,000 tons of crude gypsum from its San Marcos Island quarry, Mexico, to North China ports.

Road Convention in Chicago, Week of January 22

THE annual convention of the American Road Builders' Association will be held in Chicago, Ill., the week of January 22, 1934. The exhibit will be held in the Stevens Hotel, and will not be an old-time "Road Show." Models and photographs will take the place of much full-sized machinery.



The Chemists' Corner

Lime Is the Most Economical Cooking Agent for Making the "Hard" Sheet of Straw Paper

By Herbert P. Bailey,
The Moore Lime Co., Springfield, Ohio

LIME is the cheapest alkali for cooking straw to make the "hard" sheet of straw paper. Lime costs less per pound than any of the other alkalies frequently used for cooking purposes, and pound for pound less lime is used than any other cooking agent to do the same amount of work. Lime cooked stock, properly aged, will make the "hard" sheet of paper at lower costs and give the best machine performance.

In the paper straw industry it is a common practice to use an alkali, preferably straight lime, or lime and soda ash, or caustic soda, etc., as a cooking agent for straw for preparing paper stock.

The National Lime Association says: "The function of lime in this process is to dissolve out the noncellulose constituents of the lime and thus be sure of getting well cooked stock.

Prior to about 1927, the straw paper industry used lime altogether as the cooking agent. The process employed in the treatment of straw with lime in the manufacture of straw paper was said to be very crude. The usual procedure was to stuff straw into an ellipsoidal rotary digester having a diameter of about 14 feet. A milk of lime solution was then added, steam admitted, the mass cooked down and then more straw added until the maximum capacity of the rotary was reached. The mixture was then rotated for about 10 hours. Some mills used 15 lb. steam pressure; others as high as 45 lb. As a rule, the steam pressure was not carefully regulated. Very few mills kept a record of the quantity of straw charged. The idea was merely to cook the straw with a lime solution, and, inasmuch as the quantity of straw charged was more or less unknown, and little attention was given to other factors that affect the cooking, the usual procedure was to add a surplus of straw and aid in the disintegration of the fiber."

Following the cooking operation, the stock from the rotaries was conveyed to pits and allowed to drain. Mills with large storage pits could allow their stock to drain 24 hours,

and by aging the stock for this length of time it was found that less lime was used per ton of raw straw than if the stock was used up directly from the rotaries without aging. Consequently, the amount of lime used per ton of straw paper varied and no two mills seemed to be doing the same thing. One mill would use 190 lb. of lime per ton of raw straw and another would use upward of 250 lb.

After the aging operation, the stock was conveyed to beaters where the fibers were properly drawn out and at the same time washed. Following this the stock was sent through a jordan, then to the paper machine to be made into paper.

The straw paper made in this way generally contained considerable lime and was said to be "soft," yet for corrugating purposes, etc., it was entirely satisfactory.

About 1927 the straw paper industry was forced to meet some new competition. Chestnut chip paper was introduced to the box manufacturers for corrugating purposes, etc.

At about the same time the box plants

demanded a "harder" sheet because it was found that as the "hardness" of the corrugated straw paper was increased, the box plant could get by with a lighter weight liner and this meant quite a saving.

The straw mills now had a real problem at hand. Their worries started. They were obliged to make the "hard" sheet or lose considerable business to competitors.

One of the first cooking agents used in order to produce the "hard" sheet of straw paper was soda ash. Caustic soda was also tried, but after considerable experimenting, most of the mills finally decided on a lime-soda ash mixture, which to this day seems to be the most popular cooking material.

Advantages of Lime Exclusively

Of all the various materials used for cooking straw, lime is undoubtedly the cheapest. The best grades of lime, suitable for cooking straw, can be bought (at this writing) for around \$7 a net ton, in bulk, f.o.b. straw mill. Soda ash, according to market quotations (at the same time) is priced in bags at \$23



Line of rotary digesters, showing inlet ends, in plant producing insulating board

Rock Products

29

a net ton, while the average freight rate is \$3, making the delivered price \$26 a net ton. This \$26 figure may more or less vary. The same might be said of lime; however, regardless of what price you have, the fact is that ash is more expensive than lime and the ratio in price to large and small buyers will be about 3 or 4 to 1.

Now, the question is, why don't the mills use straight lime instead of a combination of lime and soda ash for cooking? Certainly the lime cook is cheaper and since both materials are alkalies, they should make the "hard" sheet.

Some mills say they have used lime for years and cannot make the "hard" sheet. Naturally, this is true when one considers the "guesswork" methods many mills employ. Remember, the easy way is not the best way unless it is the correct way. Certain mills are now making the "hard" sheet with lime. Physical tests show the "hardness" of this paper to be equal to paper having lime plus .60 to 70 lb. of soda ash per ton of finished paper. Let us consider the chemical properties of both lime and soda ash and get the reason why lime will make the "hard" sheet.

Lime is an alkali. It is frequently mentioned as the "Queen of the Alkalies." It combines with water to form calcium hydroxide in accordance with the following equation:



Lime is only slightly soluble in water (see Table I). In 3,000 gal. of water, the amount of water generally added when cooking 6

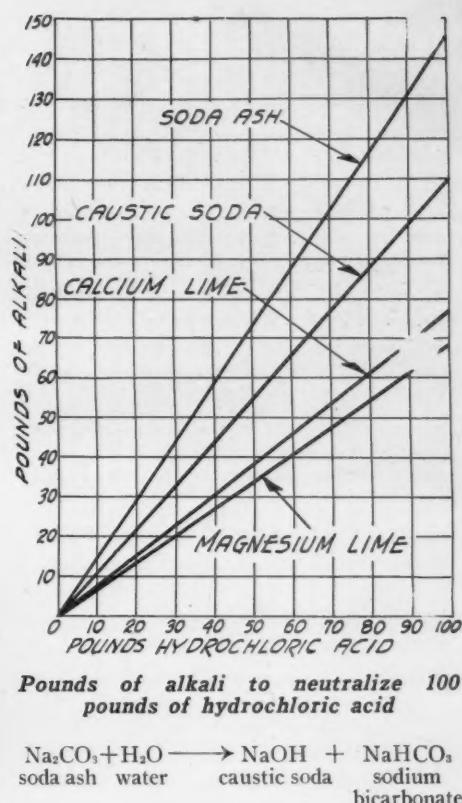
tons of straw, only about 32.6 lb. of pure calcium oxide would be dissolved. The temperature of the water in this case is assumed to be 0 deg. C. If the temperature was higher, say 80 deg., then less lime would go into solution, in fact, but 16.7 lb. of pure calcium oxide would be dissolved. Hence, lime can be said to be only slightly soluble, and it is more soluble in cold water than hot.

TABLE I*—SOLUBILITIES OF LIME, SODA ASH AND CAUSTIC SODA

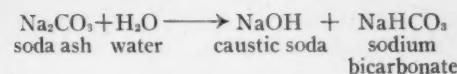
	—Solubility in 100 parts of—	
	Cold water	Hot water
CaO	0.131 0 deg. C.	0.067 80 deg. C.
Quicklime.		
Ca(OH) ₂ ..	0.17 0 deg. C.	0.08 100 deg. C.
Calcium hydroxide.		
Na ₂ CO ₃ ...	7.1 0 deg. C.	45.4 100 deg. C.
Soda ash.		
NaOH ...	.42 0 deg. C.	365.0 110 deg. C.
Caustic soda.		



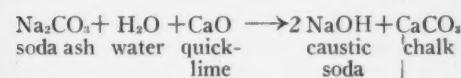
Single-face corrugated straw paper (above) before crush test, and after crush test (below)



Pounds of alkali to neutralize 100 pounds of hydrochloric acid



Soda ash is soluble in both hot and cold water (see Table I). Soda ash when added to a milk of lime solution is causticized; that is, the soda ash is converted to caustic soda by the lime:

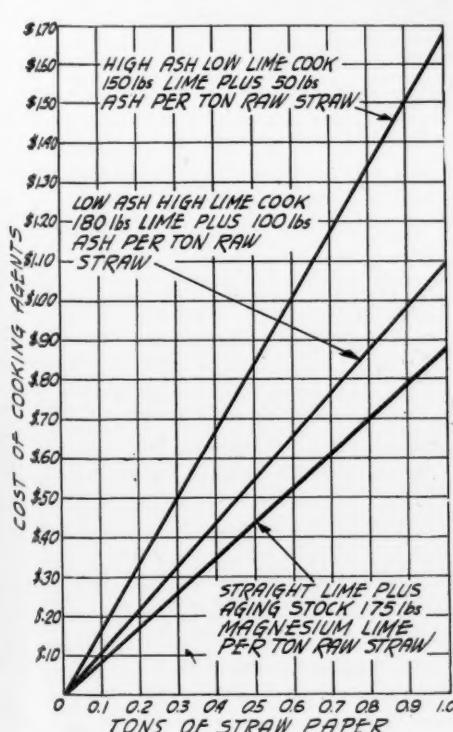


Thus, when we speak of the lime-soda ash cook, it is here shown that a chemical change takes place between these two alkalies and a third alkaline material is formed, known as caustic soda (sodium hydroxide), and it is this material that then proceeds to react upon the straw.

Soda ash and caustic soda have a high "caustic strength." The "alkaline strength" is shown to be weak.

Keeping the above facts in mind, let us turn our attention to cooking straw. For cooking agents, alkalies are used. An alkali is a substance which in water solutions has the hydroxyl radical (OH). It is shown that lime plus water forms calcium hydroxide $\text{Ca}(\text{OH})_2$, hence in a straight lime cook, the cooking agent is calcium hydroxide. When lime and soda ash are mixed together in water, it is shown that they react chemically to form sodium hydroxide (caustic soda— NaOH), hence in a lime-soda ash cook, the cooking agent is sodium hydroxide. In either case, the hydroxide (OH) is formed and, in a sense, is the material we are interested in as far as cooking straw is concerned.

Continuing this discussion of cooking straw, Calcium hydroxide is but slightly soluble in water. Sodium hydroxide is highly soluble. Hence, with sodium hydroxide we are able



Cost of cooking agents per ton of straw paper, assuming yield of 70%; lime at \$7 a ton and soda ash at \$26 a ton

*Handbook of Chemistry and Physics by Chemical Rubber Pub. Co.

Rock Products

November 25, 1933

to form a more concentrated solution than we are with calcium hydroxide.

Now as to the influence of concentration. Suppose one purchased at the drug store a gallon of hydrochloric acid and into this acid dropped a piece of zinc. A larger amount of this acid will dissolve the zinc no faster than a smaller amount, but substitution of more concentrated acid will instantly increase the speed of the action.

Now in the case of cooking straw with lime. The lime is introduced into the rotary in the form of milk of lime, which is finely divided calcium hydroxide suspended in a saturated solution of calcium hydroxide. The lime in solution acts on the straw. This has a tendency to weaken the solution but this tendency is continually opposed by more of the suspended lime dissolving. Since lime does not form a strongly concentrated solution, the speed at which the chemical change takes place will be slow. Therefore, it is said to take more time for lime to cook straw.

In cooking with lime-soda ash, all of the caustic of the alkali introduced in the rotary digester will be present in solution. At the beginning of the digestion it will be present in maximum concentration and there is danger of over-cooking some of the straw. However, regardless of whether there is or is not any straw over-cooked, the fact is that lime-soda ash forms a strongly concentrated solution, and because of this the speed at which the chemical change takes place will be fast.[†]

Consequently, since lime-soda ash forms a more concentrated solution than straight lime, and since in any chemical change the apparent activity, and therefore the speed of that change is related to the concentration, it is understood why lime takes so much longer to cook straw than a mixture of lime-soda ash.

Now as to the influence of temperature on the speed of any chemical change. Steam is admitted into the rotary digesters. As shown, some mills use 15 lb. steam pressure, others use upward of 45 lb. The temperature of the digesters increases with an increase in steam pressure. The activity of chemical changes, and therefore the speed of all chemical changes, is increased by raising the temperature. Consequently, the purpose of introducing steam in the rotary digesters is to hasten the chemical reaction. There is no set rule as to the rate at which the speed is increased with a rise in temperature, but the general rule is a rise of 10 deg. doubles the speed of every action.

With reference to the quantity of alkali for cooking straw: In the example above it is shown that 68 lb. of magnesium lime, 77 lb. of calcium lime, 110 lb. of caustic soda and 145 lb. of soda ash, each will neutralize the same quantity of a given acid. Putting this another way, let us assume the straw is our material to be acted upon chemically.

[†]Speed decreases as concentration diminishes.

Then, for a given quantity of straw, it would take 68 lb. of magnesium lime and so on up to 145 lb. of soda ash.

Up to this point then, it is shown that both straight lime and lime-soda ash form the hydroxyl radical (OH) and cook straw; that caustic soda will do its work in less time than other alkalies, while lime requires the longest time; that pound for pound it takes less lime than other cooking agents to do the same amount of work.

The problem now is a very simple one. Knowing the above facts, let us turn our attention to the cost of the various alkalies. Soda ash would average about \$26 a ton while lime was valued at \$7 a ton. Therefore, is it logical to buy \$26 alkali when \$7 alkali will do the work, considering in addition that you use less of the \$7 material to cook a unit mass of straw than you do of the \$26 material?

In practice, various quantities of alkalies are used. Each straw mill has worked out what its operators believe to be the best formula or mix. When mills made the "soft" paper, as much as 250 lb. of lime was used per ton of raw straw. Assuming a yield of 70% and lime at \$7 a ton, the cooking cost in this instance would be \$1.25 per ton of finished paper.

Considering the present-day lime-soda ash cooks, some mills believe in high lime and low ash mix, whereas others prefer low lime high ash. A mix of 180 lb. of lime and 10 lb. of ash per ton of raw straw is about the lowest priced cook involving the use of both lime and ash that has been brought to the writer's attention. At prices named herein and assuming 70% yield, this mix would figure \$1.09 per ton of finished paper. Many mills are using 150 lb. of lime and 50 lb. of soda ash per ton of raw straw. This mix would show a cost of \$1.68 per ton of finished paper.

With reference to the straight lime cook that mills are using today to make the "hard" sheet. The quantity of lime in this cook must be kept at a minimum. Since lime is a stronger alkali, less can be used to do the same work. However, lime is a slower acting alkali and therefore, in order to get the most out of the lime cook, the stock must be aged. A mill aging its stock 20 hours is using 175 lb. of magnesium lime per ton of raw straw. This cook will cost 88c per ton of finished paper, or 21c per ton of paper cheaper than any other cook mentioned here.

TABLE II—COMPARISON OF ALKALI COSTS
SUMMARY OF COSTS[‡]

Cooking agents	70% yield	Cost per ton finished paper,
250 lb. lime per ton raw straw.....	\$1.25	
180 lb. lime plus 10 lb. ash per ton raw straw	1.09	
150 lb. lime plus 50 lb. ash per ton raw straw	1.68	
175 lb. lime per ton raw straw plus aging stock .....	.88	

[‡]Soda ash figured at \$26 a ton and lime at \$7 a ton.

Laboratory tests of the stock aged 20 hours revealed some lime. If this mill would age the stock for a longer time, less lime undoubtedly would be used and still obtain satisfactory stock.

Temperature, as we pointed out before, will influence the speed of cooking. Hence, in this connection, each mill will have its own individual conditions and problems. Even at the same mill, the speed of the cooking action of stock in storage pits will change with the seasons of the year. In winter, the outside temperature will be low and the reaction will be slow. In summer, the temperature is high and the reaction will be fast. It is difficult to state what should be done and what should not be done. A paper man experienced in the art of cooking will soon determine the correct quantity of lime and time for aging, and, by making laboratory tests to determine the quantity of lime left in the stock at the end of the aging period, the operator will soon arrive at the most favorable conditions.

With regard to the "hardness" of the paper that is made with the various cooking agents, there is no standard method of making "hardness" or crushing tests of corrugated paper. A number of mills have laboratory equipment, so in testing the paper reported here, the writer had the same laboratory make all the tests. Consequently, if the method of testing is not the best, it is at least comparative.

TABLE III—CRUSHING TEST RESULTS
OF SINGLE FACED CORRUGATED
34 POUND STRAW PAPER

Cooking agent	Pounds per square inch
Old lime cook.....	High 24 Low 14
High lime and low soda ash.....	28 16
Low lime and high soda ash.....	35 20
Lime cook and aging stock.....	30 23

The writer understands a number of mills are using the straight lime cook and aging the stock. Unfortunately, do not know the quantity of lime used nor the time for aging. The paper, however, is very satisfactory from the point of "hardness."

It is reasonable to expect that lime can make a paper having at least the same "hardness" because, after all, we are cooking with an alkali, and there is no reason why the hydroxyl radical (OH) in caustic soda, or any other alkali, should cook the straw any differently than the hydroxyl radical (OH) in lime, providing proper allowances are made. The allowances as shown here are: First, reduce the quantity of lime so that there is not a surplus; and, second, give the lime cooking agent a little more time to do its work.

To age stock, larger storage pits are necessary. However, since it is possible to make an altogether satisfactory grade of paper at lower costs with lime, then it would pay to build an annex to the present pit in order to get the extra storage space. Remember, too large a quantity of alkali is not only expensive but also likely to lead to trouble in a number of ways.

Rock Products

As to machine operations, it goes without saying that the best paper and highest production can be made with the lime cooked stock.

Straw paper producers should be urged to study the possibilities of aging the stock. Perhaps with a few minor changes in the pit, they can age the stock. Don't let them overlook the fact that the longer they age the stock up to certain limits, the lower the cooking cost. If box plants hesitate about using lime cooked straw because it has a characteristic yellow color, even though the paper has a high crust test, they can darken the sheet by coloring with 3% or so of ferrous sulphate (based on lime used). Other coloring materials can be used, but the point is if the trade "thinks" the darker colored paper is better, it is easy to give them this kind of paper by adding a small amount of the above iron compound.

Summary

To summarize, lime is recommended for use in cooking straw today for the following reasons:

- (1) It is the most economical cooking agent.
- (2) It is an alkali the same as caustic ash and has the hydroxyl radical (OH) which, in a sense, is the cooking material.
- (3) Pound for pound you can use less than other cooking agents to do the same amount of work.
- (4) Tests show the "hard" sheet of paper can be made.
- (5) Lime cooked stock gives the best machine performance.

The writer wishes to acknowledge gratefully the assistance rendered him by Charles Austin, J. Kastetter, W. Galloway and Dr. J. Barker.

Portland Cement Yardage

AWARDS of concrete pavement for October and for the first ten months of 1933 are announced by the Portland Cement Association as follows:

	Sq yd.	Sq yd.
awarded during	awarded to date,	
October, 1933	Oct. 28, 1933	
Roads	6,409,092	28,859,470
Streets	1,525,077	4,644,859
Alleys	35,827	163,697
Total	7,969,996	33,668,026

Sand-Lime Brick Production and Shipments in October

THE following data are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada. The accompanying statistics may be regarded as representative of the industry.

Ten sand-lime brick plants reported for the month of October, this number being

one less than the number reporting for the month of September, statistics for which were published October 25.

Average Prices for October

Shipping point	Plant price	De- livered
Dayton, Ohio	\$10.00	\$11.00
Grand Rapids, Mich. ....	....	12.00
Mishawaka, Ind.	8.50	....
Saginaw, Mich.	10.00	....
Syracuse, N. Y.	18.00	20.00
Detroit, Mich.	10.50	11.50
Toronto, Ont., Can.	12.00	13.50

Statistics for September and October

	*September	*October
Production	903,200	881,750
Shipments (rail)	15,000	19,000
Shipments (truck)	975,187	890,639
Stocks on hand	2,608,434	2,188,653
Unfilled orders	315,000	245,000

[†]Eleven plants reporting; incomplete, four not reporting unfilled orders.

^{*}Ten plants reporting; incomplete, seven not reporting unfilled orders.

The Grande Brick Co., Grand Rapids, Mich., reports shipping 125,000 sand-lime brick to Battle Creek, Mich., to be used on the addition being built to the Food City Brewing Co.

Sioux Falls Pressed Brick Co., Sioux Falls, S. D., expects to furnish 300,000 sand-lime brick for a city hall, 600,000 for a high school and 250,000 for a grade school to be erected in 1934 out of government funds. The plans are now in the architects' hands.

◆ ◆ ◆

Lime

Dolomitic Refractories Industry has submitted the following amendment and addition to the Code of Fair Competition of the Lime Industry:

Article VI

Within the meaning of this Code, as amended by the additions of this Article VI, the term "Lime Industry" not only has the meaning stated in Article I, Section 1, but also includes the manufacture of dolomitic lime for sale as a refractory, irrespective of the extent of burning or of other refinements. The manufacture of dolomitic lime (referred to herein as "dolomite") for sale as a refractory is hereinafter referred to as the dolomite division of the Lime Industry, which division throughout the continental United States shall constitute a self-governing branch of the Lime Industry to the same extent and in the same respects as each Lime Industry District constitutes a self-governing branch of the Lime Industry. The members of the dolomite division shall select a "Dolomite Control Committee" for the entire United States, consisting of one representative of each such manufacturer. The Dolomite Control Committee shall exercise and perform the duties and powers in respect to the dolomite division which the District Control Committees have under the Code in respect to their respective districts, and shall be subject to the same restrictions, limitations and requirements. References in this Code to the respective Lime Industry Districts or District Control Committees shall be construed as also referring to the dolomite division or to the Dolomite Control Committee, as the case may be, unless the context requires a different construction, except that the term "District," when applied to the dolomite division shall refer to the continental United States. The Dolomite Control Committee shall also exercise and

perform in respect to the dolomite division the powers and duties which the Trade Relations Committee has in respect to the remainder of the Lime Industry under Article III, Section 1; Article III, Section 3, subdivisions (c) and (d); Article IV, Section 2; and Article V, Sections 1 and 2 including the provisions contained in subdivision (b) of Section 2 of Article V as to collecting reports and furnishing them to the Administrator. The last sentence in subdivision (a) of Section 5 of Article V shall not be applicable to the Dolomite Industry provided that appeal may be taken to the Administrator from the Dolomite Control Committee in the manner and in the respects specified in subdivision (c) of Section 5 of Article V. The representatives appointed by the Administrator to the Trade Relations Committee pursuant to Section 1 of Article V shall *ipso facto* be appointed to the Dolomite Control Committee and, as representatives on the Dolomite Control Committee, shall have the same powers and duties in respect of the dolomite division as they have as representatives on the Trade Relations Committee in respect to the remainder of the Lime Industry. The Trade Relations Committee and the Dolomite Control Committee shall from time to time determine and agree upon the portion of the cost of the administration of this Code to be borne by the dolomite division, which portion shall be apportioned among the manufacturers of dolomite as they may themselves agree.

For the purpose of facilitating the administration of this Code within the dolomite division in cooperation with the Administrator any member or representative of the Trade Relations Committee designated by it shall be a non-voting member of the Dolomite Control Committee.

◆ ◆ ◆

Quarter Master General, U. S. A., has approved the use of lime for plaster on all Army Post construction. The specifications read:

Scratch Coat shall be composed of one volume of lime putty and two volumes of sand, with one bushel of hair per cu. yd. of sand, to which 200 lb. of Keene's cement is added for each cu. yd. of scratch coat. Each batch shall be thoroughly mixed using clean box and tools.

Brown Coat shall be composed of one volume of lime putty and three volumes of sand, with $\frac{1}{2}$ bushel of hair per cu. yd. of sand, to which 150 lb. of Keene's cement is added for each cu. yd. of brown coat. Each batch shall be thoroughly mixed using clean box and tools.

Finish Coat shall be the same as specified for gypsum plaster.

The U. S. Treasury Department specifications, under which nearly all other Federal building work is done, already provide for the use of lime plaster.

◆ ◆ ◆

Sand and Gravel

Modern Sand and Gravel Co., Pacific, Mo., has been changed over to electric-power operation throughout, including pump dredge.

◆ ◆ ◆

John J. Carroll, sand and gravel producer, Taunton, Mass., has asked the city for more than his contract price for sand because of increased costs under the NRA. The request was referred to the city solicitor for a legal opinion.



Hints and Helps for Superintendents

Acetylene Generating Plant

THE USE of acetylene generating equipment whereby the operators generate their own acetylene for oxy-welding work is a fast growing field. It is getting its firmest foothold in sections remote from industrial centers, such as the Hoover dam, at which sand and gravel plant the accompanying photograph was taken. Appreciation of the econ-



Shelter for welding unit

mies and advantages of such equipment is continuously increasing among rock products operators.

The generator for the shop at the sand and gravel plant is located far enough from the plant to avoid a nuisance from the odor, and it is protected from sun and rain by the simple shed-like structure shown.

A Derail for the Quarry Ramp

A SIMPLE DERAIL for a quarry ramp can be made from three pieces of old discarded rail without much trouble. First an old switch point is placed adjacent the inside of one rail with the lower end firmly secured to the cross ties but with upper end free to swing against the rail or to stay clear of it. Beside the outside of the opposite rail is attached an old piece of rail about 15 ft. long, also secured at the lower end to the cross tie but free to swing at the upper end.

The base at the upper end of this rail is removed for several feet and the rail raised slightly on the ties so that the flange will slide over on the rail of the ramp track. Then when the switch point and the second piece of rail are joined together by an iron bar they will act together as the derail. When the switch point is against the inside of the rail in the "derail" position, then the

flange of the second rail has slid over the flange of the ramp rail and will at once lift a car wheel off the rail and permit the switch point to send the car completely off the track.

To keep the derail out of position except when needed the third rail is used. This is securely fastened outside of the track and beyond the second rail so that the lower end is rigid but the upper end swings freely. This rail is then sprung and bolted to the iron cross bar so that its spring action will always draw the derail away from the track and keep it clear.

To set the derail, a right angle lever lying flat on an extended cross tie, is used, as shown in the illustration. The short arm of the lever is attached to the end of the iron cross bar and the lever is pivoted to the cross tie at the right angle. Then a slight pull on the outside arm of the lever will bring a much stronger pull outwards on the cross bar and thus set the derail. The derail may be set from nearby by hand, but it is more desirable to attach a cable to the lever and carry the line up along the quarry ramp to the crusher house where the man in charge of the hoist can pull it when necessary. To protect the cable it is advisable to run it through an old pipe along the quarry ramp.

Such a derail as this placed midway up the ramp may prevent serious accidents and damage at the foot of the quarry ramp and is a safety precaution both for the men working there and for other quarry cars that may be waiting below.

Blasting Experience in Hard Tough Granite

A T Cayce, S. C., the Weston & Brooker Co. operates a pit quarry in granite. This granite has a percentage of wear of 2.5; a French coefficient of 16; hardness, 18.3; toughness, 13; crushing strength in pounds per square inch, 33,090. Notwithstanding these physical characteristics close attention to details gives more than average blasting economy. The methods employed are described by T. I. Weston, president of the company, who is an engineer of note, in I. C. 674 of the U. S. Bureau of Mines.

Primary drilling is done by four churn drills, each operated by a 25-hp., 550-v., a.c. electric motor. On the benches the drill holes are 6 in. in diameter, spaced 25 ft. between centers and 18 ft. from the face, and drilled 1 ft. below the quarry floor. When the full quarry face is to be shot, the holes are spaced 20 ft. between centers and the same distance from the face and are sunk 10 ft. below the quarry floor. Regulation chisel bits are used. For drilling bench holes the bits are hand-sharpened, but for deep holes they are sharpened by machine because machine-sharpened bits are better for long holes in seam rock and drill a hole of more regular shape. The normal string of tools weighs 1,070 lb., divided as follows: Bit, 240 lb.; stem, 800 lb., and rope socket, 30 lb. The drills make fifty 36-in. strokes per minute, and the sludge is pumped about every hour. The bits are used 2 to 4 hours before they are removed for sharpen-



Derail device and control arrangement

ing. A wooden platform on which a 4-ft. length of casing is mounted acts as a guide in starting holes. The average rate of drilling is about $7\frac{1}{2}$ ft. in 10 hours, although a depth of as much as 20 ft. is sometimes obtained in that time. Cracks or seams in the granite occasionally cause trouble in drilling, in which case scrap wrought iron (old chain, etc.) is thrown into the hole and beaten into the cracks with the drill. If this treatment fails the bad section of the hole is filled with cement, which is drilled out after it has set firmly.

Secondary drilling is done with 12 jack-hammers using $\frac{7}{8}$ -in. solid steel for holes up to 6 ft. deep and 2 tripod drills with $1\frac{1}{4}$ -in. hollow steel for wet drilling holes 6 to 20 ft. deep. Compressed air is supplied from branch lines leading down the face of the quarry from a main air line which nearly encircles the pit at the surface. The air pressure at the compressors is 110 lb. per sq. in., which gives a working pressure of about 85 lb. at the drills. All rock weighing more than one-half ton, which amounts to 25 to 30% of the total, is blockholed.

Figs. 1 and 2 show loading diagrams for various bench and full-face holes. Gelatin dynamites of 60 and 75% strength are used in sticks 16 in. long and $4\frac{1}{2}$ in. in diameter. The stronger dynamite is employed only in the bottom of the holes and averages about 25% of the total used in primary blasting. The holes are not sprung.

Double-countered cordeau is used for detonation and is connected with a main lead of uncountered cordeau which is fired by a No. 6 detonator by means of a hand-operated magneto. Loading is done by a crew of six men; one man opens the boxes, one man loads powder, one man loads sand tamping, and three men tamp. The first 200 to 300 lb. of dynamite are lowered into each hole, and the rest is dropped in. A timber billet

5 in. in diameter and 5 ft. long loaded with lead and weighing 100 lb. is used as a tamponing block. From 45 min. to an hour is required to load a 75-ft. hole. From three to twelve holes are fired at a time.

A considerable variation will be noted in the loading of the four holes shown in Fig. 1. In hole 1 much of the burden at the top was pulled by a previous shot, but the toe was unusually heavy. In hole 2 the burden was fairly even, but seams and deep cracks along the bottom indicated that the usual 150-lb. charge of 75% dynamite could be reduced. Holes 3 and 4 show loadings under normal conditions where the burden is solid and of uniform depth.

Spaced 25 ft. between centers and with a burden of 18 ft., the four bench holes shown, using 3,100 lb. of dynamite, broke 123,300 cu. ft. or 10,000 tons of rock—a ratio of $3\frac{1}{4}$ tons per lb. of explosive.

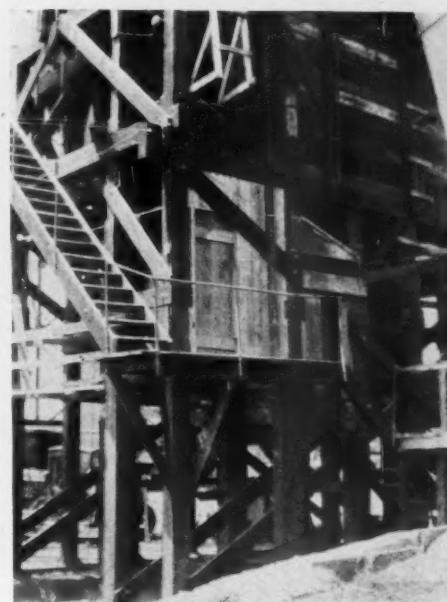
In Fig. 2, which illustrates the loading of full-face or deep holes, the charges in the two holes are staggered insofar as practicable to bring the explosive in one hole opposite tamping in the adjoining one. These deep holes are carried 10 ft. below the quarry floor instead of only 1 ft., as with bench holes. Spaced 20 ft. between centers and with a 20-ft. burden, the two holes shown, using 2,800 lb. of dynamite, broke 11,750 tons of rock (4.2 tons per lb. of explosive). Thus in the deep holes the rock broken per lb. of explosive is about 30% more than in the shallower bench holes and equally good fragmentation is obtained because of closer spacing. On account of the large increase in the duty of the explosive when used in deep holes, benching will be abandoned as soon as the bench at the north end of the quarry is worked back to the quarry face.

There are no adobe shots. All secondary blast holes are loaded and tamped with sand by a crew of two men. Forty per cent

gelatin dynamite in 1x8-in. sticks is fired by No. 6 detonators and safety fuse with a burning rate of 1 ft. in 40 seconds. Approximately 125 lb. of dynamite per day are used in secondary blasting, and about 1,250 tons of rock are loaded per day; the duty obtained, therefore, is equal to 10 tons of rock per pound of explosive. Secondary shots are fired at noon and at 6 p.m.

Waterproofing Bunker Bottoms

OIL drainings from motor trucks and cars serve as good waterproofing and preserver for the inside and bottoms of bunkers. The accompanying illustration shows a set of rock and gravel bunkers that



Bunker service lengthened

were treated with oil drainings several years ago. They have served their purpose well in the face of hard usage, and this is due in part to the preservative action of this no-cost waterproofing.

Reducing Crusher Repairs

AN INNOVATION at the crushing plant of the Moctezuma Copper Co., Nacozari, Mexico, that has considerably decreased crusher repair costs is a method of repairing the worn mantles of the No. 8 McCully crushers, the *Engineering and Mining Journal* reports.

The departure from former practice consists in the use of short manganese rods, curved to fit the circumference of the crusher mantle, which are welded carefully first to the worn mantle surface and then to each other until the original mantle surface is restored. The $\frac{1}{2}$ -in. manganese rods cost only 14 c. a pound, compared with 66 c. a pound for manganese welding rods. Moreover, the procedure effects a 50% reduction in time, power and welding material.

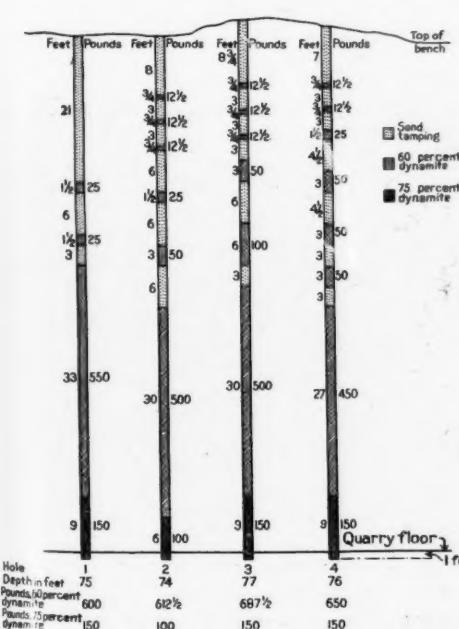


Fig. 1—Loading diagram

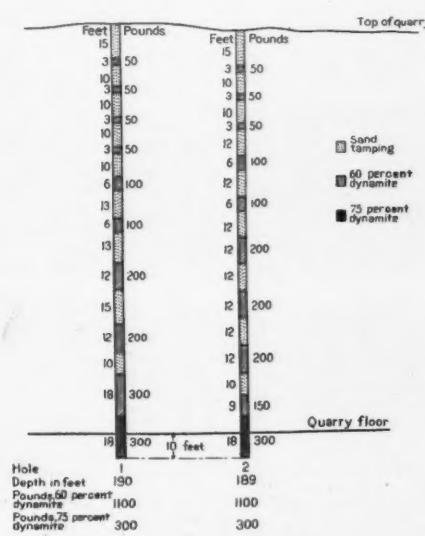


Fig. 2—Loading full face holes

Aggregates Statistics

Noncommercial Production Increases in 1932*

IN THE CODE of fair competition for the crushed stone, sand and gravel, and slag industries, 1933, provision is made for the establishment of 16 regions to be used for administrative purposes in connection with the code. The boundaries of these regions are shown in Figs. 1 and 2.

Statistics of aggregate production, as compiled by the U. S. Bureau of Mines, have been set up in past years to show state totals. All states have not always been included be-

cause publication of some of the figures would reveal confidential returns. In Tables 1 and 2, however, the data for all states are combined to show sand and gravel, and crushed stone sold or used by producers in

statistics for 1932 are released here for the first time.

In Fig. 1, the total area of each circle represents the quantity of sand and gravel sold or used by producers in each region during 1931. Each black sector shows the extent of the decline in 1932. Increases in 1932 are represented by outer concentric circles, except in Regions 1 and 12 where the increases are too small to be shown graphically.

for the most part reflects accelerated activity by states, counties, and municipalities; non-commercial production in these regions increased considerably in 1932. As may be expected, the unit value, in general, declined the most in those regions where production increased. This indicates a relatively higher proportion of noncommercial material.

Crushed stone production is summarized in Table II and Fig. 2. Noncommercial production makes up a lesser proportion of crushed stone output, and, as a result, only one region, Nebraska and Iowa, showed an increase in 1932 over 1931. Of interest, too, is the fact that crushed stone production also tends toward concentration in the industrial

TABLE I.—SAND AND GRAVEL SOLD OR USED BY PRODUCERS, BY REGIONS ESTABLISHED IN CODE OF FAIR COMPETITION 1931 AND 1932

Regions	1931			1932			Change from 1931, percent		
	Short tons	Value	Value per ton	Short tons	Value	Value per ton	Short tons	Value	Value per ton
United States	153,479,044	\$86,280,320	\$0.56	120,077,897	\$57,522,076	\$0.48	-21.8	-33.3	-14.3
Region									
1. Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island	11,596,489	4,737,057	.41	11,901,918	3,378,051	.28	+ 2.6	-28.7	-31.7
2. New York	17,155,174	10,612,014	.62	9,232,390	5,644,328	.61	-46.2	-46.8	-1.6
3. Pennsylvania, New Jersey, and Delaware	12,679,598	10,474,895	.83	8,072,099	5,861,083	.73	-36.3	-44.0	-12.0
4. West Virginia, Virginia, Maryland, and District of Columbia	5,401,757	4,649,003	.86	5,264,261	4,514,630	.86	-2.5	-2.9	...
5. South Carolina, Georgia, Alabama, Florida, and Mississippi	4,056,994	1,950,965	.48	2,001,030	917,128	.46	-50.7	-53.0	-4.2
6. North Carolina, Kentucky, and Tennessee	3,403,445	2,176,235	.64	3,071,953	1,783,808	.58	-9.7	-18.0	-9.4
7. Arkansas, Louisiana, and Texas	12,648,125	8,120,734	.64	6,262,453	3,509,462	.56	-50.5	-56.8	-12.5
8. Ohio	8,387,377	5,216,816	.62	5,695,546	3,440,534	.60	-32.1	-34.0	-3.2
9. Illinois and Indiana	20,389,393	9,445,995	.46	13,725,699	6,024,029	.44	-32.7	-36.2	-4.3
10. Michigan and Wisconsin	13,316,257	5,322,713	.40	9,089,373	3,598,405	.40	-31.7	-32.4	...
11. North Dakota, South Dakota, and Minnesota	6,955,078	3,376,224	.49	7,667,835	2,397,960	.31	+10.2	-29.0	-36.7
12. Nebraska and Iowa	6,507,313	2,937,234	.45	6,788,225	2,314,217	.34	+ 4.3	-21.2	-24.4
13. Kansas, Missouri, and Oklahoma	8,638,621	4,509,782	.52	5,993,834	3,299,588	.55	-30.6	-26.8	+ 5.8
14. Wyoming, Colorado, New Mexico, Utah, and Arizona	4,365,056	2,541,642	.58	6,175,411	3,303,933	.54	+41.5	+30.0	-6.9
15. California and Nevada	11,859,772	7,282,583	.61	7,583,819	4,101,156	.54	-36.1	-43.5	-11.5
16. Montana, Washington, Oregon, and Idaho	6,118,595	2,956,428	.48	11,512,051	3,433,764	.30	+88.1	+16.1	-37.5

cause publication of some of the figures would reveal confidential returns. In Tables 1 and 2, however, the data for all states are combined to show sand and gravel, and crushed stone sold or used by producers in

1931 and 1932, by regions established in the code. These same data are presented graphically in the accompanying maps. Detailed

Appreciable declines in production in 1932 were registered in the regions of large production around the Great Lakes and the Atlantic Seaboard. California and the South also showed large declines. On the other

hand, production in New England, the Rocky Mountain States, and the Northwest was greater in 1932 than in 1931. This increase Northeast with only a small output in the Rocky Mountain States. In general, the unit value of crushed stone held up better than that of sand and gravel in the calendar year of 1932.

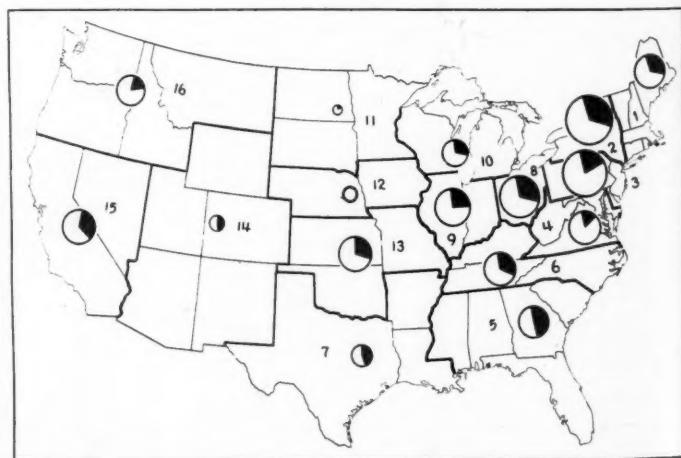
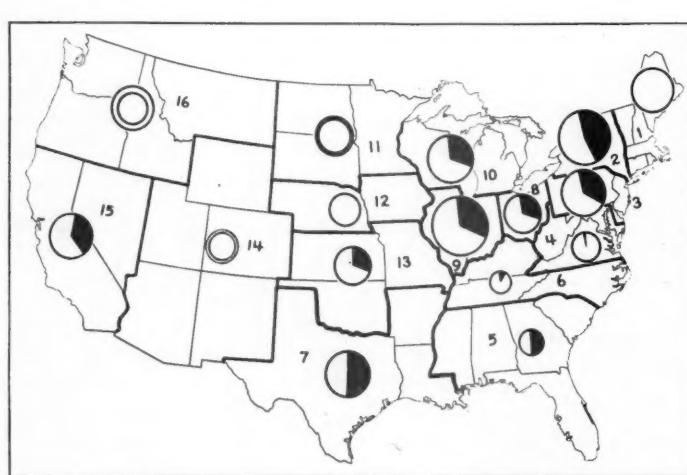


Fig. 1—Map (left) shows sand and gravel sold or used in U. S. by code regions. Each circle represents tonnage in 1931; black sectors show decline in 1932; outer concentric circles show increase in 1932. Fig. 2—Map (right) similarly shows crushed stone sold or used in 1931 and 1932.

Rock Products

35

Noncommercial Production

Prior to 1931, total crushed stone, sand and gravel sales reported to the Bureau of Mines were representative of the aggregate industries, within reasonable limits of accuracy. Some material produced by states, counties, municipalities, and other government agencies was included in the totals each year, but these quantities amounted to only about 10% or less of the totals. These data are summarized in Table III.

By 1931, however, the noncommercial production of sand and gravel had increased to 24,540,355 short tons, representing 16% of the total. A further increase to 34,748,821 short tons, 29% of the total accounted for, was recorded in 1932. Meanwhile, noncommercial production of crushed stone in 1932 amounted to 8,710,910 short tons, almost 17% of the total.

Local Activity

Complete statistical coverage of aggregates production by states, counties, and municipalities is impossible without a field staff. As a result, reports of noncommercial production

TABLE III.—SAND AND GRAVEL AND CRUSHED STONE SOLD OR USED IN THE UNITED STATES BY COMMERCIAL AND NON-COMMERCIAL OPERATORS, 1928-1932¹

YEAR	Commercial Operations		Non-Commercial Operations ²		Total Accounted for	
	Short tons	Change from year before Per Cent	Short tons	Change from year before Per Cent	Short tons	Change from year before Per Cent
Sand and Gravel						
1928	199,519,577	...	9,599,231	...	209,118,808	...
1929	206,218,734	+ 3.4	16,353,171	+ 70.4	222,571,905	+ 6.4
1930	176,880,106	-14.2	20,171,620	+ 23.3	197,051,726	-11.5
1931	128,938,689	-27.1	24,540,355	+ 21.7	153,479,044	-22.1
1932	85,289,076	-33.9	34,748,821	+ 41.6	120,037,897	-21.8
Crushed Stone						
1928	...	...	...	...	91,265,360	...
1929	85,409,260	...	7,312,000	...	92,721,260	+ 1.6
1930	79,560,890	-6.8	7,550,000	+ 3.3	87,110,890	-6.1
1931	64,818,410	-18.5	7,806,000	+ 3.4	72,624,410	-16.6
1932	42,284,190	-33.2	8,710,910	+ 11.6	51,995,100	-28.4

¹ The figures for "non-commercial operations" represent tonnages reported by States, counties, municipalities, and other government agencies, produced either by themselves or by contractors expressly for their consumption, often with publicly-owned equipment. They do not include purchases from commercial producers.

The figures for "commercial operations" represent tonnages reported by all other producers, including relatively small amounts of railroad ballast and fill produced directly by railroad carriers for their own use.

² Part of the apparent large increase in non-commercial production is due to more complete reports in the later years. Even the 1932 figures are probably not complete, as it is often difficult for the local authorities to supply this information.

may not be received from strictly comparable sources each year. Although part of the large increase in this material since 1928 may be due to more complete statistical returns, much of it is due directly to local ac-

tivity in road construction in connection with projects designed to relieve unemployment. In 1932, for example, notable increases in noncommercial production of sand and gravel were recorded in Colorado, Idaho, Iowa,

TABLE IV.—SAND AND GRAVEL AND CRUSHED STONE SOLD OR USED BY COMMERCIAL AND NON-COMMERCIAL PRODUCERS IN THE UNITED STATES, 1931 AND 1932

Sand and Gravel	1931			1932			Change from 1931, percent		
	Short tons	Value	Value per ton	Short tons	Value	Value per ton	In tonnage Value	Value per ton	
Commercial Operations:									
Sand:									
Glass	1,677,882	\$ 2,779,245	\$ 1.66	1,370,255	\$ 2,266,564	\$ 1.65	-18.3	-18.4	-0.6
Molding	2,138,305	2,122,049	.99	1,118,146	1,051,702	.94	-47.7	-50.4	-5.1
Building	25,154,296	13,653,565	.54	14,597,631	7,507,700	.51	-42.0	-45.0	-5.6
Paving	25,362,674	12,558,050	.50	17,194,553	7,623,597	.44	-32.2	-39.3	-12.0
Grinding and polishing	607,589	1,105,213	1.82	419,691	638,556	1.52	-30.9	-42.2	-16.5
Fire or furnace	88,189	131,640	1.49	36,698	54,371	1.48	-58.4	-58.7	-0.7
Engine	1,604,123	1,012,548	.63	1,151,011	688,563	.60	-28.2	-32.0	-4.8
Filter	55,319	119,825	2.17	68,035	92,751	1.36	+23.0	-22.6	-37.3
Other ¹	5,683,266	2,050,348	.36	4,486,655	1,463,650	.33	-21.1	-28.6	-8.3
Total sand	62,371,643	\$ 35,532,483	\$ 0.57	40,442,675	\$ 21,387,454	\$ 0.53	-35.2	-39.8	-7.0
Gravel:									
Building	21,377,015	\$ 15,411,716	\$ 0.72	13,064,368	\$ 9,549,698	\$ 0.73	-38.9	-38.0	+ 1.4
Paving	34,346,857	21,998,870	.64	25,137,550	14,727,893	.59	-26.8	-33.1	-7.8
Railroad ballast ²	10,843,174	3,528,684	.33	6,644,483	1,823,993	.27	-38.7	-48.3	-18.2
Total gravel	66,567,046	\$ 40,939,270	\$ 0.62	44,846,401	\$ 26,101,584	\$ 0.58	-32.6	-36.2	-6.5
Total sand and gravel	128,938,689	\$ 76,471,753	\$ 0.59	85,289,076	\$ 47,489,038	\$ 0.56	-33.9	-37.9	-5.1
Non-commercial operations:									
(By states, counties, and municipalities, directly or under lease):									
Sand:									
Building	24,276	\$ 7,491	\$ 0.31	147,636	\$ 97,233	\$ 0.66	+508.2	+1,198.7	+112.9
Paving	2,096,907	1,156,772	.55	2,204,564	1,013,337	.46	+5.1	-12.4	-16.4
Total sand	2,121,183	\$ 1,164,263	\$ 0.55	2,352,200	\$ 1,110,620	\$ 0.47	+10.9	-4.6	-14.5
Gravel:									
Building	49,799	\$ 37,993	\$ 0.76	1,000,702	\$ 253,931	\$ 0.25	+1,909.5	+568.4	-67.1
Paving	22,369,373	8,606,311	.38	31,395,919	8,668,487	.28	+40.4	+0.7	-26.3
Total gravel	22,419,172	\$ 8,644,304	\$ 0.39	32,396,621	\$ 8,922,418	\$ 0.28	+44.5	+3.2	-28.2
Total sand and gravel	24,540,355	\$ 9,808,567	\$ 0.40	34,748,821	\$ 10,033,038	\$ 0.29	+41.6	+2.3	-27.5
Commercial and non-commercial:									
Sand	64,492,826	\$ 36,696,746	\$ 0.57	42,794,875	\$ 22,498,074	\$ 0.53	-33.6	-38.7	-7.0
Gravel	88,986,218	49,583,574	.56	77,243,022	35,024,002	.45	-13.2	-29.4	-19.6
Grand total	153,479,044	\$ 86,280,320	\$ 0.56	120,037,897	\$ 57,522,076	\$ 0.48	-21.8	-33.3	-14.3
Crushed Stone									
Commercial operations:									
Concrete and road metal	58,005,520	\$	\$	39,309,650	\$	\$	-32.2	... . . . .	... . . . .
Railroad ballast	6,812,890	5,496,455	.81	3,974,540	3,239,991	.82	-41.7	-41.1	+ 1.2
Non-commercial operations:									
Concrete and road metal	7,806,000	.....	....	8,710,910	.....	....	+11.6	....	....
Total concrete and road metal	65,811,520	\$ 64,908,509	\$ 0.99	48,020,560	\$ 43,651,774	\$ 0.91	-27.0	-32.7	-8.1
Total railroad ballast	6,812,890	5,496,455	.81	3,974,540	3,239,991	.82	-41.7	-41.1	+ 1.2
Grand total	72,624,410	\$ 70,404,964	\$ 0.97	51,995,100	\$ 46,891,765	\$ 0.90	-28.4	-33.4	-7.2
Crushed Stone, Sand, and Gravel									
Commercial operations	193,757,099	.....	....	128,573,266	.....	....	-33.6	....	....
Non-commercial operations	32,346,355	.....	....	43,459,731	.....	....	+34.4	....	....
Grand total	226,103,454	\$ 156,685,284	\$ 0.69	172,032,997	\$ 104,413,841	\$ 0.61	-23.9	-33.4	-11.6

¹ Includes some sand used for railroad ballast, fills, etc.

² Includes some gravel used for fills and other purposes. The quantity of gravel reported as used exclusively for railroad ballast was as follows: 1931: 8,814,907 tons, valued at \$2,898,598; 1932, 5,113,862 tons, valued at \$1,513,240. Includes ballast produced by railroads for their own use, which amounted in 1932 to 2,140,154 tons, valued at \$293,328.

TABLE II.—CRUSHED STONE SOLD OR USED BY PRODUCERS, BY REGIONS ESTABLISHED IN CODE OF FAIR COMPETITION
1931 AND 1932

Regions	1931			1932			Change from 1931, percent		
	Short tons	Value	Value per ton	Short tons	Value	Value per ton	Short tons	Value	Value per ton
United States ¹	72,624,410	\$70,404,964	\$0.97	51,995,100	\$46,891,765	\$0.90	-28.4	-33.4	-7.2
Region									
1. Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island	4,481,090	5,000,365	1.12	3,029,990	2,899,632	.96	-32.4	-42.0	-14.3
2. New York	10,659,130	12,586,288	1.18	7,073,840	7,615,484	1.08	-33.6	-39.5	-8.5
3. Pennsylvania, New Jersey, and Delaware	9,056,950	9,919,755	1.10	7,221,710	7,498,210	1.04	-20.3	-24.4	-5.5
4. West Virginia, Virginia, Maryland, and District of Columbia ²	4,636,320	4,686,714	1.01	3,900,270	3,948,572	1.01	-15.9	-15.7	...
5. South Carolina, Georgia, Alabama, Florida, and Mississippi ²	4,292,230	4,235,731	.99	2,212,280	1,851,262	.84	-48.5	-56.3	-15.2
6. North Carolina, Kentucky, and Tennessee	4,390,350	4,127,878	.94	2,934,030	2,505,077	.85	-33.2	-39.3	-9.6
7. Arkansas, Louisiana, and Texas	2,164,150	2,172,324	1.00	1,161,930	1,128,268	.97	-46.3	-48.1	-3.0
8. Ohio	7,016,620	4,592,285	.65	4,876,600	3,284,593	.67	-30.5	-28.5	+3.1
9. Illinois and Indiana	5,832,030	4,031,445	.69	4,322,640	2,981,936	.69	-25.9	-26.0	...
10. Michigan and Wisconsin	3,043,530	2,594,935	.85	2,149,710	1,601,383	.74	-29.4	-38.3	-12.9
11. North Dakota, South Dakota, and Minnesota	452,710	517,206	1.14	381,140	363,444	.95	-15.8	-29.7	-16.7
12. Nebraska and Iowa	1,117,320	1,042,179	.93	1,518,230	1,321,437	.87	+35.9	+26.8	-6.5
13. Kansas, Missouri, and Oklahoma	4,817,310	4,663,351	.97	5,612,970	3,288,225	.91	-25.0	-29.5	-6.2
14. Wyoming, Colorado, New Mexico, Utah, and Arizona	1,062,090	1,034,249	.97	555,540	487,967	.88	-47.7	-52.8	-9.3
15. California and Nevada	4,856,480	4,521,054	.93	3,172,000	2,651,983	.84	-34.7	-41.3	-9.7
16. Montana, Washington, Oregon, and Idaho	3,883,450	3,464,647	.89	3,152,010	2,527,925	.80	-18.8	-27.0	-10.1

¹ United States figures do not exactly equal totals of districts because returns from a few companies have not been included in State figures.² No crushed stone production reported in the District of Columbia or in Mississippi.

Montana, New Mexico, North Dakota, Rhode Island, Tennessee and Washington.

Government Operations

Less than one-third of the sand and gravel produced by government agencies, 7,727,085 short tons in 1931 and 8,057,448 short tons in 1932, was screened, washed, or otherwise prepared. By far the larger part consisted of pit-run material having a low unit value. The average value of all noncommercial sand and gravel in 1932 was \$0.29 a ton, as contrasted with \$0.56 a ton for the output of the commercial industry.

Inclusion of a variable quantity of low-grade material produced by states, counties, and municipalities obviously tends to obscure trends in production by plants producing prepared sand and gravel or crushed stone to be sold in competitive markets. In recognition of the importance of segregating noncommercial production of aggregates, the Bureau of Mines presents for the first time in 1932 a statistical breakdown to show production by states, counties, and municipalities (noncommercial), in their proper relation to sales by privately-owned plants (commercial). These data are summarized in Table IV.

Crushed Stone

Bloomington, Ind.; Monroe county commissioners let contracts November 7 for several thousand cubic yards of crushed stone at \$1.19-\$1.20 per cu. yd. Previous bids for the same jobs a short time ago were \$1.35-\$1.45.

◆ ◆ ◆

Ohio State Highway Department has been conducting experiments to cure asphalt treated highways of skiddy surfaces. Kerosene, burlap, whitewash and crushed stone are the ingredients. On macadam types a layer of $\frac{1}{2}$ to $\frac{3}{4}$ -in. crushed stone is put on the surface, sprinkled with kerosene, and the kerosene ignited. The heat softens the

surface permitting the new stone to be bonded in. Asphalt coated brick pavements are whitewashed and asphalt comes off when the whitewash is peeled off. The burlap is applied over new concrete to give a roughened surface.

◆ ◆ ◆

Birmingham Slag Co., Birmingham, Ala., has a contract for 100,000 tons of rip rap to be used by the U. S. Government on Mississippi river work near Greenfield, Miss. One quarry is operated under lease from the Tennessee Coal, Iron and Railroad Co. and is near Birmingham, at Trussville; another is leased from the Colrock Asphalt Co., Florence, Ala.

◆ ◆ ◆

Le Grand Limestone Co., Lake View, Ia., has offered to lease and operate quarry and crushing plant, and the sand and gravel plant, of Larimer and Shaffer, Inc., Cedar Rapids, Ia., which is in receivership. The offer made to the receiver provides that the Le Grand company shall operate the property for one year, furnish all necessary capital for the operation and shall have an option to purchase same at the end of a year for the sum of \$55,000, payable as follows: All of the net profits from the operation of said properties during the year shall be paid to the receiver and applied on the purchase price, one-half of the balance of said purchase price shall be paid within one year thereafter, and the other one-half of the balance to be paid within two years thereafter, and in the event the said Le Grand Lime Stone Co. does not exercise its option to purchase said properties, all of the net profits from the operation of said properties during the year shall be turned over to and become the absolute property of the receivers.

◆ ◆ ◆

W. W. Boxley & Co., Roanoke, Va., crushed stone producers, have taken a contract for constructing a heavy-duty, reinforced-concrete highway from Coal Creek,

Tenn., to the Norris dam site, for the Tennessee Valley Authority. The pavement will be 4.8 miles long and 22 ft. wide. The contract price was \$256,233.50. The job must be completed within a period of 69 days.

◆ ◆ ◆

Lehigh Stone Co., Kankakee, Ill., officials have incorporated the Corn Belt Construction Co. to do general construction work.

◆ ◆ ◆

Ohio State Highway Material Inspector Ray Rumer was dumped with a carload of crushed stone into an unloading pit at Washington Court House, recently. He went through the hopper of a gondola car and was buried with the stone. He was rescued, cut and bruised, but alive.

◆ ◆ ◆

Gates Gyratory Crusher inventor, P. W. Gates, died in Chicago, November 8, at the age of 76. He was president of the Gates Iron Co., original manufacturer of the Gates crusher, until it was absorbed by the Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

◆ ◆ ◆

Gilbert Brothers, Bound Brook, N. J., who purchased the Rocky Hill quarry, Palisade, N. J., last March, are reported to have completed \$200,000 improvements, giving them one of the most up-to-date moderate sized operations in the country. A radial system of ground storage is used, with a total capacity of 200,000 tons. A modern dust-collecting system has been installed.

◆ ◆ ◆

Lawrence Crushed Stone Co., Salem, Mass., has been perpetually enjoined by the state superior court from operating a quarry and crushing plant "so that it would cause stone to fly and strike houses and buildings and generally interfere with the comfort and enjoyment of tenants and property owners."

Editorial Comments

The code of fair competition for the Crushed Stone, Sand and Gravel, and Slag Industries is now the law for this great group of rock product industries. A cursory examination or reading of the code, published complete in this issue of ROCK PRODUCTS, makes it appear unnecessarily long and complicated.

Beginning of a Noble Experiment

A better understanding, gained by re-reading several times, should dispel some of this impression, and should convince the reader that it covers the ground with great thoroughness. Considered as a compromise, not of a compact group of a single industry, but of three or more groups extremely competitive one with another, we get some appreciation of the great step forward in industrial cooperation that the mere drafting and acceptance of this code means.

With this ground plan a splendid opportunity exists to re-establish this great industry on sound economic lines. Obviously, the plan alone will not accomplish more than to provide the opportunity. There will be many soreheads to contend with at the very start, for the code contains nearly all the features that were fought so bitterly by various groups, particularly by the operators of portable plants. Only through a unanimous spirit of conciliation and justice can these early sores be healed.

The industry has become one great commonwealth. The town-meeting stage of handling its business is over. Committee members or leaders will be really elected representatives rather than merely "goats" who volunteer to work, as has been the case too often in trade associations in the past. Naturally, this is no reflection on the leaders of the past or present; for possibly that method is more likely to insure capable leaders than those who may be elected under the New Deal. The point is that the average member of a trade association, or of an industry, has hitherto not thought that there was enough at stake to take a very active interest in its management. He can no longer feel that way. He can no longer take the *laissez faire* attitude toward his association, or his industry, or his country, for which business men have been so unanimously condemned of late years.

Committee members will have heavy responsibilities and great opportunities. Their responsibilities will include not merely the custody of their own private fortunes, but the welfare of their industry and the welfare of their country. Their opportunities, as in the case of any governing authority, will be great to advance their own interests and those of their friends; there will also be a great opportunity for public service. How they shoulder their responsibilities and use their opportunities will determine the success of the code; and to some extent anyway the success of the entire NRA experiment in industrial self-government.

Business and industrial leaders have always preached (and sometimes set examples of) clean business ethics. Hitherto they could only appeal for cooperation to estab-

lish decency and honesty in business conduct. Now they can compel compliance—not cooperation, for cooperation is always voluntary. They can compel compliance so far as any authority can compel compliance with a law. But to get universal compliance with any law there must be cooperation as well as compulsion.

It will be easy for a producer to overstep the restrictions of this code, intentionally or innocently, as the case may be; just as it is easy for the expert to find loopholes in every law and regulation. And there can always be discretion in their enforcement. The more complicated and detailed the code, the easier it will prove to find the loopholes, or to have irregular enforcement, because the real spirit of the law is lost in a verbiage of minor details. But the producer who is able to see clearly the spirit or absorb the philosophy of the code will not look for loopholes; he will be, of course, seriously concerned with its effect upon his own business; but he *must* consider its effect on the industry.

To the industry the code is its *magna charta*, the first co-operative attempt to define its breadth and its limitations and to establish its place in the scheme of industry as a whole. It provides the first cooperative opportunity to meet openly and above board many irritating and perplexing competitive problems. It is the Crushed Stone, Sand and Gravel, and Slag Industries' share in the "profits" of the industrial and economic revolution we are passing through.

More than upon any other industry, or group of industries, the responsibility rests upon the Crushed Stone, Sand and Gravel, and Slag Industries, to prove the success of this code, and of the philosophy of industrial self-government, and of the suppression of private business greed, behind the code and the NRA which mothered it. For this group of industries is about to be handed great sums of public money for construction materials of public works. Next to labor, its members will be among the first groups of American citizens to get a share in the "profits" of the industrial recovery part of the NRA.

Let the members of these industries heed well some recent remarks of Donald R. Richberg, general counsel of the NRA, to the Academy of Political Science:

"The National Recovery Administration is not seeking to establish a dictator or a group of dictators of industry, but is, in fact, moving in precisely the opposite direction. It is seeking to establish such self-governing organizations of business men as may prevent the rise of any more irresponsible dictators of industry, such as those who guided the American people along the road to ruin in the years before 1929. The individualism of a pioneer people cannot be preserved in a modern industrialized state. But it has not yet been proved that the only alternative is to surrender to state socialism. It is my belief that there is a half way house of democratic cooperation and self-discipline which lies between the anarchy of irresponsible individualism and the tyranny of state socialism."

Recent Quotations on Rock Products Securities

Stock	Date	Bid	Asked	Dividend	Stock	Date	Bid	Asked	Dividend
Allentown P. C., com. ⁴⁷	11-23-33	3	5		McCrady-Rodgers, 7% pfd. ⁴⁷	11-23-33	35	40	
Allentown P. C., pfd. ⁴⁷	11-23-33	6	8		Medusa P. C., com.	11-20-33	5	10	
Alpha P. C., com.	11-20-33	15	15½		Medusa P. C., pfd. ⁴⁷	11-23-33	20	35	
Alpha P. C., pfd.	11-20-33	6050 qu. Sept. 15, '33	Michigan L. and C., com. ⁴⁷	11-23-33	50	50	
Amalgamated Phos. 6's, '36 ⁴⁷	11-23-33	95	98		Missouri P. C., com.	11-21-33	6½	
American Aggregates, com. ⁴⁷	11-23-33	1	2		Monarch Cement, com. ⁴⁷	11-23-33	40	50	
American Aggregates, pfd. ⁴⁷	11-23-33	10	15		Monolith P. C., com.	11-16-33	1	2½	
American Aggregates 6's, w.w. ⁴⁷	11-23-33	25	30		Monolith P. C., pfd.	11-16-33	4	4½	25c qu. Sept. 28, '33
American Aggregates 6's, ex. w. ⁴⁷	11-23-33	20	28		Monolith P. C., units ⁴⁷	11-22-33	6	8	
American L. and S., 1st 7's ⁴⁷	11-23-33	50	55		Monolith P. C., 1st Mtg. 6's ⁴⁷	11-23-33	75	82	
Arundel Corp., com. ⁴⁷	11-20-33	22½	actual sale	50c qu. Oct. 2, '33	Monolith Portland, Midwest ⁴⁷	11-23-33	½	1	
Bessemer L. and C., Class A ⁴⁷	11-23-33	3	5		National Cem. (Can.), 1st 7's....	10-13-33	No market		
Bessemer L. and C., 1st 6½'s ⁴⁷	11-23-33	15	17		National Gypsum A, com.	11-21-33	6	6½	
Bessemer L. and C., cert. of dep. ⁴⁷	11-23-33	15	17		National Gypsum, pfd.	11-21-33	68	71	1.75 qu. Oct. 1, '33
Bloomington Limestone 6's ⁴⁷	11-23-33	6	9		National L. & S., 6½'s, 1941 ⁴⁷	11-23-33	80	83	
Boston S. and G., new com. ³⁷	10-13-33	1		Nazareth Cement, com. ⁴⁷	11-23-33	3	5	
Boston S. and G., new 7% pfd. ³⁷	10-13-33	5		Nazareth Cement, pfd. ⁴⁷	11-23-33	30	35	
Boston S. and G., T's, 1924 ¹⁹	10-13-33	40		Newaygo P. C., 1st 6½'s ⁴⁷	11-23-33	40	45	
California Art Tile, A ⁰	10-15-33	1	2		New England Lime 6's, 1935 ⁴	10-11-33	6	
California Art Tile, B ⁰	10-15-33	½		N. Y. Trap Rock 1st 6's, 1946 ⁴	11-20-33	48 actual sale		
Calaveras Cement, com.	11-16-33	1½	6		N. Y. Trap Rock, 7% pfd. ⁴⁷	11-23-33	65	70	1.75 qu. Jan. 3, '33
Calaveras Cement, 7% pfd.	11-16-33	40	70	1.75 qu. Oct. 15, '33	North Amer. Cement 1st 6½'s ⁴⁷	11-23-33	20	25	
Canada Cement, com.	11-18-33	5¾	6		North Amer. Cement, com. ⁴⁷	11-23-33	1	2	
Canada Cement, pfd.	11-18-33	27½	28½		North Amer. Cement, 7% pfd. ⁴⁷	11-23-33	2	3	
Canada Cement, 5½'s, 1947 ⁴⁷	11-7-33	74	76		North Shore Mat. 1st 6's ⁴⁷	11-23-33	40	45	
Canada Crushed Stone bonds ⁴²	10-13-33	62	66		Northwestern States P. C. ⁴⁷	11-21-33	35	37	
Canada Crushed Stone, com. ⁴²	10-13-33	2½	....	Northwestern Port. Cem. units.	9-23-33	30	35	
Certaineed Products, com.	11-20-33	3¾	4		Ohio River S. and G., com.	11-18-33	5	
Certaineed Products, pfd.	11-20-33	12	24		Ohio River S. and G., 1st pfd. ⁴⁷	11-18-33	50	
Certaineed Products, 5½'s, '48 ⁴⁶	11-20-33	46½	actual sale		Ohio River S. and G., 6's ⁴⁷	11-23-33	8	12	
Cleveland Quarries	11-20-33	24		Ohio River S. and G., 2nd pfd.	11-18-33	20	
Consol. Cement, 1st 6½'s A ⁴⁷	11-23-33	8	11		Oregon P. C., com. ⁴⁷	11-23-33	12	15	
Consolidated Cement, pfd. ⁴⁷	11-23-33	1	2		Oregon P. C., pfd. ⁴⁷	11-23-33	65	70	
Consolidated Oka S. and G. (Canada) 6½'s ¹²	10-13-33	20		Pacific Coast Aggr., com. ⁴⁰	10-13-33	10c	
Consolidated Oka S. and G. (Canada), pfd. ⁴²	10-13-33	No market		Pacific Coast Aggr., pfd. ⁴⁰	10-13-33	20c	....	
Consol. Rock Prod., com. ⁴⁷	11-23-33	½	1		Pacific Coast Aggr., 6½'s, '44 ⁵	10-13-33	15	17	
Consol. Rock Prod., pfd. ⁴⁷	11-23-33	1	2	Pacific Coast Aggr., 7's, 1939 ⁴	10-13-33	1	3		
Consol. Rock Prod., units ⁴⁷	11-23-33	2	3	Pacific Coast Cement 6's, 1937 ⁴⁷	11-23-33	45	47		
Consol. S. and G., pfd. (Can.) ¹²	10-13-33	No market		Pacific P. C., com. ⁴⁰	10-13-33	5	6½		
Construction Mat., com. ⁴⁷	11-23-33	1	2	Pacific P. C., pfd. ⁴⁰	10-13-33	31	36		
Construction Mat., pfd. ⁴⁷	11-23-33	2½	4	Pacific P. C. 6's, 1935 ⁴⁷	11-23-33	88	91		
Consumers Rock & Gravel, 1st Mtg. 6's, 1948 ⁴⁷	11-23-33	40	45	Pacific P. C. 6½'s, pfd. ⁵	10-15-33	32½	....	1.62½ qu. Jan. 5, '33
Coosa P. C., 1st 6's ⁴⁷	11-23-33	15	20	Pearless Cement, com. ⁴⁷	11-23-33	2	3		
Coplay Cement Mfg., pfd. ⁴⁷	11-23-33	6	8	Pearless Cement, pfd. ⁴⁷	11-23-33	4	4		
Coplay Cement Mfg., 6's, 614 ⁴⁷	11-23-33	35	40	Penn.-Dixie Cement, com.	11-20-33	4½	4½		
Dewey P. C., com. ⁴⁷	11-23-33	70	90	Penn.-Dixie Cement, pfd.	11-18-33	12½	14		
Dolese and Shepard....	11-21-33	9	10	Penn.-Dixie Cement 6's A....	11-20-33	58½	actual sale		
Dufferin Pav. & Cr. Stone, com.	11-18-33	1½	....	Penn. Glass Sand Corp., pfd. ⁴⁷	11-23-33	68	75	1.75 qu. Oct. 2, '33
Dufferin Pav. & Cr. Stone, pfd.	11-18-33	16	....	Penn. Glass Sand Corp., 6's ⁴⁷	11-23-33	98	97	
Edison P. C., com. ⁴⁷	11-23-33	2	4	Petroskey P. C., com.	11-21-33	1	1½		
Edison P. C., pfd. ⁴⁷	11-23-33	4	6	Petroskey P. C., 1941, 11-21-33	39	44			
Federal P. C. 6½'s, 1941 ⁴⁷	11-23-33	35	38	Phosphate Mining Co. (N. Y.), com.	9-23-33	No market			
Giant P. C., com. ⁴⁷	11-23-33	2	4	Port Stockton Cem., com. ⁹	10-14-33	No market			
Giant P. C., pfd. ⁴⁷	11-23-33	10	15						
Gyp. Lime & Alabastine, Ltd....	11-16-33	3½	....	Republic P. C. 6's, 1943....	11-21-33	63	68	
Gyp. Lime & Alabastine 5½'s, 1948....	11-7-33	43	45	Riverside Cement, A ⁴⁷	11-23-33	4	6		
Hermitage Cement, com. ⁴⁷	11-23-33	10	15	Riverside Cement, B ⁴⁷	11-23-33	1	2		
Hermitage Cement, pfd. ⁴⁷	11-23-33	40	50	Riverside Cement, pfd.	11-16-33	73½	actual sale	1.50 qu. Nov. 1, '33	
Ideal Cement 5's, 1943 ⁴⁷	11-23-33	94	97	Rockland and Rockport Lime, 1st pfd.	10-21-33	1	2		
Ideal Cement, com.	11-20-33	22	25	Sandusky Cement 6's ⁴⁷	11-23-33	30	35		
Indiana Limestone 6's ⁴⁷	11-23-33	15	20	Sandusky Cement 6½'s, 1932-1937 ⁴⁷	11-23-33	35	40		
International Cement, com.	11-20-33	31	32	Santa Cruz P. C., com. ⁴⁷	11-23-33	55	60	1.00 qu. Oct. 2, '33	
International Cement bonds, 5's 11-20-33	82	actual sale		Schumacher Wallboard, com. ⁴⁷	11-23-33	1	2		
Kelley Island L. and T....	11-21-33	6	10	Schumacher Wallboard, pfd. ⁴⁷	11-23-33	3	5		
Ky. Cons. Stone, 6½'s, 1933....	11-18-33	5	6	Signal Mt. P. C., pfd. ⁴⁷	11-23-33	10	15		
Ky. Cons. Stone, com. ⁴⁷	11-23-33	....	1	Southwestern P. C., units ⁴⁷	11-23-33	170	200	
Ky. Cons. Stone, pfd.	9-23-33	10	....	Southwestern P. C., com. ⁴⁷	11-23-33	30	40	1.00 qu. Oct. 2, '33
Ky. Cons. Stone, 7% pfd. ⁴⁷	11-23-33	5	....	Southwestern P. C., pfd. ⁴⁷	11-23-33	80	100	2.00 qu. Oct. 2, '33
Ky. Cons. Stone, 1st Mtg. 6½'s ⁴⁰ 10-24-33	5	....	Standard Paving & Mat. (Canada), com.	11-18-33	1½	20		
Ky. Rock Asphalt, com.	11-18-33	....	Standard Paving & Mat., pfd.	11-18-33	10	25	27½ c mo. Dec. 1, '33	
Ky. Rock Asphalt, pfd.	11-18-33	10	....	Superior P. C. A ⁴⁷	11-23-33	20	25	27½ c mo. Dec. 1, '33
Ky. Rock Asphalt 6½'s, 1935....	11-18-33	55	62½	Superior P. C. B ⁴⁷	11-23-33	5	7	27½ c mo. Dec. 1, '33	
Kentucky Stone, com.	8-19-33	8	14						
Kentucky Stone, pfd.	8-19-33	....	10					
Lawrence P. C....	11-20-33	9½	14	Trinity P. C., units ⁴⁷	11-23-33	26	30		
Lawrence P. C. 5½'s, 1942 ⁴⁷	11-23-33	55	60	Trinity P. C., com. ⁴⁷	11-23-33	5	10		
Lehigh P. C., com.	11-20-33	13½	14	Trinity P. C., pfd. ⁴⁷	11-23-33	22	26		
Lehigh P. C., pfd.	11-20-33	74½	77						
Louisville Cement ⁴⁷	11-23-33	70	80	U. S. Gypsum, com.	11-20-33	45	46½	25c qu. Jan. 2, '34	
Lyman-Richey 1st 6's, 1935 ⁴⁷	11-23-33	80	85	U. S. Gypsum, pfd.	11-20-33	110½	115	1.75 qu. Jan. 2, '34	
Marbelite Corp., com. (cement products)	7-15-33	5c	½	Wabash P. C. ⁴⁷	11-23-33	4	6		
Marbelite Corp., pfd.	7-15-33	¼	....	Warner Co., 1st 7% pfd. ⁴⁷	11-23-33	3	5	
Marquette Cement, com. ⁴⁷	11-23-33	7½	8½	Warner Co., 1st 6's, 1944, w.w.	11-17-33	17	20		
Marquette Cement, pfd. ⁴⁷	11-23-33	50	54	Warner Co., 6's, 1944, ex.w.	11-17-33	10	14		
Marquette Cem. Mfg. 1st 5's, 1936 ⁴⁷	11-23-33	65	70	Whitehall Cem. Mfg., com. ⁴⁷	11-23-33	10	16		
Marquette Cem. Mfg. 1st 6's, 1936 ⁴⁶	10-24-33	65	(nominal)	Whitehall Cem. Mfg., pfd. ⁴⁷	11-23-33	15	20		
Material Service Corp. ⁴⁷	11-23-33	5	7	Whitehall Cem. Mfg., 6's, 1944 ⁴⁷	11-23-33	35	45		
McCrady-Rodgers, com. ⁴⁷	11-23-33	7	10	Wisconsin L. & C. 1st 6's, '33 ⁴⁷	11-23-33	70	90		
				Wisconsin L. & C. 6½'s ⁴⁷	11-23-33	70	90		
				Wolverine P. C., com. ⁴⁷	11-23-33	1½	2½		
				Yosemite P. C., A com. ⁴⁷	11-23-33	2	4		

Quotations by: ⁵Smith, Camp & Riley, San Francisco, Calif. ^{9A}A. E. White Co., San Francisco, Calif. ¹²James Richardson & Sons, Ltd., Winnipeg, Man. ¹⁴First Wisconsin Co., Milwaukee, Wis. ³⁷Wise, Hobbs & Arnold, Boston. ⁴⁰Martin Judge, Jr., and Co., San Francisco, Calif. ⁴²Nesbitt, Thomson & Co., Toronto. ⁴³First Union Trust & Savings Bank, Chicago, Ill. ⁴⁷Anderson Plotz and Co., Chicago, Ill.

North American Cement Corp., New York City, reports for the 12 months ended September 30, net loss of \$841,279 after taxes, depreciation, depletion, interest and amortization, comparing with net loss of \$869,874 for the 12 months ended September 30, 1932.

◆ ◆ ◆

South Dakota State Cement Plant reports sales of \$173,730.15 during the quarter ended September 30, according to the quarterly report of the state cement commission filed with the secretary of state. Miscellaneous income of \$549.64 brought the total receipts to \$174,279.79. Expense items listed in the report amounted to \$163,219.01, leaving an operating profit of \$11,060.78. Capital assets listed in the report included cash and accounts receivable \$196,127.18; reserve with treasurer \$900,000; inventories \$360,330.67; and fixed assets \$2,202,230.36. Liabilities reported included accounts payable and bag redemption \$13,182.64; invested capital \$2,206,894.78; and reserves and surplus \$1,427,550.01.

◆ ◆ ◆

International Cement Corp., New York City, and subsidiaries reports for the 9 months ended September 30, net loss after taxes, depreciation, interest, reserve for contingencies and other charges, \$222,921, compared with \$1,278,666 loss for same period in 1932. Quarter ended September 30: Net profit after same deductions, \$30,236, equal to 5 cents a share on 626,278 no-par capital shares, against net loss of \$72,300 in preceding quarter and \$519,424 loss in third quarter last year.

◆ ◆ ◆

International Cement Corp., New York City, announces that at a meeting of the board of directors held November 22, Richard F. Hoyt, vice-president of Haystone Securities Corp. and former firm member of Hayden, Stone and Co., was elected chairman of the board and chairman of the executive committee, to succeed the late F. R. Bissell.

Charles L. Hogan, formerly senior vice-president, was elected president of the corporation, to succeed Holger Struckmann, who died November 17 in Copenhagen after a short illness. Mr. Hogan was also elected a member of the board and executive committee. Mr. Hogan has been associated with the International Cement Corp. since 1921, when he was appointed manager of the Cuban Portland Cement Co., an International subsidiary. In 1924 he became vice-president and the manager of International's New York subsidiary, Knickerbocker Portland Cement Co., now the Lone Star Cement Co., New York. In 1926 Mr. Hogan was elected vice-president of the International Cement Corp., and in 1928 was made senior vice-president. Mr. Hogan has been identified with the cement industry since 1910, when he became traffic manager of the Lumbermen's Portland Cement Co. In 1914 Mr. Hogan became president and manager of the Altoona Cement Co., Altoona, Kan., where he re-

mained until he became associated with International's Cuban subsidiary in 1921. As senior vice-president of the International Cement Corp., Mr. Hogan was closely associated with the late F. R. Bissell, chairman of the board, and with Holger Struckmann, late president of the company. Mr. Hogan is a member of the board of directors of the Portland Cement Association and vice-president of the Cement Institute.

◆ ◆ ◆

Vulcanite Portland Cement Co., Philadelphia, Penn.: Block of 70 shares of common stock sold at auction in Philadelphia for \$105 for the lot.

◆ ◆ ◆

Recent Dividends Announced

U. S. Gypsum Co., com. (qu.)	\$0.25	Jan. 2, 1934
U. S. Gypsum Co., pfd. (qu.)	1.75	Jan. 2, 1934
Superior Portland Cement, Inc., A, (mo.) .....	.27½	Dec. 1, 1933
Superior Portland Cement, Inc., B, (mo.) .....	.27½	Dec. 1, 1933
Riverside Cement, 1st pfd. (qu.)	1.50	Nov. 1, 1933
	◆ ◆ ◆	

Lehigh Portland Cement Co., Allentown, Penn., reports a net loss for the 12 months ending September 30, after depreciation and charges, of \$1,254,899. For the 12 months ending September 30, 1932, the net loss was \$1,329,328.

◆ ◆ ◆

Sand and Gravel

Pearis Island Sand and Gravel Co., Pearisburg, Va., has recently completed a new plant and begun operations on an island in New River. It is expected to find a market around Roanoke and Bluefield, W. Va.

Arundel Corp., Baltimore, Md., has been awarded three dredging contracts aggregating \$2,000,000—two for the Federal government in Virginia and in New York, and one for the city of Louisville, Ky. This company, which is one of the largest producers of sand and gravel, was awarded \$3,000,000 of Federal Public Works contracts in September.

◆ ◆ ◆

Central Sand and Gravel Co., Memphis, Tenn., was low bidder for furnishing a steamboat to the U. S. Army Engineers, Memphis district. The bid was \$300 per day for use on river revetment work.

◆ ◆ ◆

North Jersey Quarry Co., Morristown, N. J., has purchased the Shaw farm of 53 acres at Kenvil, N. J., for a sand and gravel operation.

◆ ◆ ◆

Independent Sand and Gravel Co., Long Island City, N. Y., was the victim of vandals who one dark night bound and imprisoned the night watchman, started the engine of a 50-ton crane and ran it off the company's wharf into the channel. Police are said to

have come to the conclusion that the job was the work of disgruntled cranesmen. The Army Engineer Department had to be called in to get the crane out of the channel.

◆ ◆ ◆

Swigert-Hart Co., Portland, Ore., has succeeded Swigert, Hart & Yett Co., with H. F. Puariea as vice-president and general manager. Under the new management the concern continues active as sand and gravel distributor, producer of ready-mixed concrete and its delivery in transit mixers; and in towing, barging and dredging. Mr. Puariea, as operator of the Portland Gravel Co., continues as producer of river sand and gravel for wholesale to retail concerns. Porter W. Yett, formerly identified with the Swigert, Hart & Yett Co., is now devoting his attention to the City Motor Trucking Co., a producer of crushed rock and a sand and gravel dealer.

◆ ◆ ◆

Sand, Gravel and Crushed Rock Producers Association, Portland, Ore., whose membership includes nearly all the producers of this vicinity, has been organized to function under the new NRA code. This association will put in a strong bid for supplying the sand, gravel and crushed rock required for the construction of the Bonneville dam and power house on the Columbia river, 40 miles east of Portland. Plans are being prepared and estimates indicate that about 1,067,400 cu. yd. of concrete will be used. Members state that the association has ample equipment for furnishing the material required. The facilities comprise dredge boats and screening plants on the Willamette and Columbia rivers, and rock quarries and crushing plants contiguous to those streams. It has been suggested that, by some channel dredging on the Columbia between Vancouver and Bonneville dam site, aggregates may be transported to the job by water.

◆ ◆ ◆

Publications Received

An Analysis and Comparison of Costs of Base Coat Plaster (National Lime Association, Washington, D. C.). Lee S. Trainor, chief engineer of the association, presents an exhaustive study of costs and advantages of lime plaster, plain, and gauged with Keene's cement and portland cement, as compared with gypsum plaster.

Sand, Clays and Minerals (Vol. 1, No. 4. Algernon Lewin Curtis, Chatteris, England). Contains interesting short articles on fluorspar; the (British) National Sand Association; gypsum; polishing powders and earths; sand analysis (chemical).

Occurrence and Physical Properties of North Carolina Marble (North Carolina State College, Raleigh, N. C.). Bulletin No. 5 of the engineering experiment station by Jasper L. Stuckey, professor of geology, and James Fontaine, research assistant, is a 24-page description of the state's marble deposits.

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week ending November 18:

New England

31219. Agricultural lime, minimum weight 60,000 lb., from Rockland, Thomaston and Warren, Me., to Ar. V., B. & Ar. and C. P. Ry. stations. (Exhibit showing proposed and present rates will be furnished upon request.) Reason—To assist the potato growers of Aroostook county by publication of reduced rates on this material, which is required immediately as a soil corrective.

31279. To amend B. & M. R. R. N. H. P. S. C. No. 1283, which names a commodity rate of 55c per net ton on common sand and run of bank or screened or crushed gravel, C. L., from Milton, N. H., to Dover Point, N. H., by changing the minimum weight as follows: Now reads: 50 net tons of 2,000 lb. Change to read: 50 net tons of 2,000 lb., except where cars of lower capacity are furnished the carload minimum weight will be the marked capacity of the car.

31453. Moulding sand, (See Note 3), from Niverville, Brookview and Van Hoesen, N. Y., to Poughkeepsie, N. Y. Present, 12½; proposed, 9.

31467. Sand, core, (See Note 2), from Davisville, R. I., to New York (33rd St.), N. Y. Present, combination; proposed, 15½.

Trunk Line

Sup. 1 to 31434. (A) Limestone (finely ground), C. L., minimum weight 50,000 lb., and (B) chemical and land lime, C. L., minimum weight, 30,000 lb., to Runyon, Englishtown, N. J., from Bittinger, Thomasville and York, Pa. (A) and (B), 14c per 100 lb., and from Cavetown, Pinola, Pa., Security and Marl, Md., (A) and (B) 13c per 100 lb.

31465. Amend Rate Proposal 31465 and Supplement 1 thereto covering limestone, from Toms Brook, Va., to Covington, Va., by changing commodity description to read as follows: "Limestone, crude, or lump, C. L., (See Note 2)," in lieu of limestone, crude or lump for furnace or fluxing purposes.

31564. Crushed stone, C. L., (See Note 2), from Millville, W. Va., to Washington, University, Terra Cotta, Chillum, Lamond, Takoma Park, Silver Spring, Chevy Chase, Bethesda, Loughborough, Dalecarlia Reservoir, Georgetown, Linden, Forest Glen, Kensington, Garrett Park, Halpine, Rockville and Derwood, 86c per ton. Rate to expire March 31, 1934.

31581 (shipper). Sand (blast, core, engine, fire, foundry, glass, moulding, quartz, silex or silica), in straight or mixed carloads. (See Note 2), to North Tonawanda, N. Y., from Dagusahonda, Pa., and Althom, Pa., \$1.40 per net ton.

Sup. 2 to 31485. Phosphate rock, crude, lump, ground; superphosphate (acidulated phosphate rock), in bulk in straight or mixed carloads, minimum weight 40,000 lb., to Benetton, Pa., from Baltimore, Md., Philadelphia, Pa., 16c per 100 lb., and from Paulsboro, N. J., \$3.35 per net ton.

31589. Sand and gravel, C. L., (See Note 2), from Cedar Lake, N. J., and Hayville, N. J., to Florence, N. J. (Burlington County), \$1.20 per net ton.

31592. Sand, in open top cars, C. L., (See Note 2), from Tatesville, Pa., to Butler, Pa., \$1.70 per net ton.

21594. Stone, crushed, C. L., (See Note 2), from Peddicord Siding, Baltimore, Md., to Ocean City, Md., \$1.70 per net ton.

31619. To increase rate of 91c per net ton to \$1.10 per net ton on crushed stone, C. L., (See Note 2), from LeRoy, N. Y., to Salamanca, N. Y.

31622. Limestone, unburned, ground, C. L., minimum weight 50,000 lb., from Natural Bridge, N. Y., to Salamanca, N. Y., and Johnsonburg, Pa., 15c per 100 lb.

31625. Sand (blast, engine, fire, foundry, glass, moulding or silica), C. L., (See Note 2), from Slatington, Pa., to Catasauqua, Pa., 70c per net ton.

31631. Limestone, unburned, ground, C. L., minimum weight 50,000 lb., from Rosendale, N. Y., to Paterson, N. J., \$1.70 per net ton.

31637. Crushed stone coated with oil, tar or asphaltum, C. L., from Bethlehem, Pa., to Mill Hall, Pa., rate \$2.15 per net ton.

Central

37437. To establish on crushed stone, agricultural limestone and agricultural limestone screenings, C. L. Rates in cents per net ton.

	To Jewett, O.	Present	Proposed
Bloomville, O.	135	125	
Gibsonburg, O.	135	125	
Maple Grove, O.	135	125	
Marble Cliff, O.	125	115	
Marion, O.	360	125	
Woodville, O.	145	135	

	To Connott, O.	Present	Proposed
Bloomville, O.	135	125	
Gibsonburg, O.	135	125	
Maple Grove, O.	135	125	
Marble Cliff, O.	125	115	
Marion, O.	360	125	
Woodville, O.	145	135	

	To Lewisburg, O.	Present	Proposed
Bloomville, O.	135	125	
Gibsonburg, O.	135	125	
Maple Grove, O.	135	125	
Marble Cliff, O.	125	115	
Marion, O.	360	125	
Woodville, O.	145	135	

37440. To establish on crushed stone and agricultural limestone, in open top cars, C. L., from Lewisburg, O., to stations on C.-G. R. R., viz:

	To	*Present	Proposed
Forestville, O.	115c N. T.	100c N. T.	
Somerside, O.	115c N. T.	100c N. T.	
Hamlet, O.	120c N. T.	100c N. T.	
Bethel, O.	120c N. T.	105c N. T.	
Russellville, O.	130c N. T.	115c N. T.	
Coney Island, O.	110c N. T.	95c N. T.	
Felicity, O.	130c N. T.	105c N. T.	

*Based on Cincinnati, O., combination.

Route—Via C. N. Ry., Cin., O., P. R. R., Carroll St. (Cincinnati), O., C.-G. R. R.

37441. To establish on crushed stone and agricultural limestone, in open top cars, C. L., from McVittys, O.

	To	Proposed	Present
Freeport, O.	135c N. T.	19c	
Loveland, O.	125c N. T.	17c	
Ravenna, O.	125c N. T.	18c	

37471. To establish on stone, furnace or foundry, melting and/or refractory (unburned), in bulk, in open top equipment, C. L., from Carey and McVittys, O., to Cincinnati, O., rate of 166c per G. T. T.

37497. To establish on crushed stone, agricultural limestone and agricultural limestone screenings, C. L., from Bloomville, O., to Lisbon, O., rate of 135c per N. T. via P. R. R., Columbian, Y. & S., Signal, P. L. & W.

37498. To establish on crushed stone, agricultural limestone and agricultural limestone screenings, C. L., from Bloomville, O., to Ashland, O., rate of 95c per N. T. Present—95 cents per N. T. (West Salem rate.)

37499. To establish on crushed stone, agricultural limestone and agricultural limestone screenings, C. L., from Bloomville, O., to B. & O. R. R. stations, viz.:

	To	Present	Proposed
Belleview, O.	100c N. T.	85c N. T.	
Lockhart, O.	100c N. T.	85c N. T.	
Gatton Rock, O.	100c N. T.	85c N. T.	
Butler, O.	100c N. T.	85c N. T.	
Ankenyton, O.	100c N. T.	90c N. T.	
Fredericktown, O.	100c N. T.	90c N. T.	
Hunt, O.	100c N. T.	100c N. T.	
Spring Mill, O.	80c N. T.	70c N. T.	
Willard, O.	80c N. T.	70c N. T.	
Boughtonville, O.	80c N. T.	70c N. T.	
New Haven, O.	80c N. T.	70c N. T.	
Greenwich, O.	80c N. T.	70c N. T.	

Tariff authority: P. R. R. 127-A.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

37500. To establish on moulding sand, C. L., from Detroit, Mich., to South Bend, Ind., rate of 176c per N. T. Present—20 cents (sixth class).

37496. To establish on crushed stone, in bulk, in open top cars, C. L., from Middlepoint, O., to Paulding, O., rate of 70c per N. T., via P. R. R., Van Wert, O., C. C. C. & St. L. Ry.

37503. To establish on crushed stone, agricultural limestone and agricultural limestone screenings, in open top cars, C. L., from McVittys, O.

To	Proposed	*Present
Amsterdam, O.	145c N. T.	19
Alliance, O.	135c N. T.	18
Bridgeport, O.	145c N. T.	20
Jewett, O.	135c N. T.	19
Connotton, O.	135c N. T.	19
Kensington, O.	135c N. T.	19
Stone Creek, O.	125c N. T.	18

*Sixth class.

37505. To establish on raw or crude dolomite stone and fluxing stone, in box car equipment, C. L., from Carey and McVittys, O., to Chicago, Ill., rate of 239c per G. T. Present rate—240c per G. T. per C. C. C. & St. L. Ry. Tariff 1732-L.

37533. To establish on crushed stone, crushed stone screenings and agricultural limestone (not ground or pulverized), in bulk, in open top cars, C. L., from Waterville, O. Illustrations (rates in cents per net ton):

To	Pres.	Route	Pro.
Adrian, Mich.	127	1	87
Ann Arbor, Mich.	127	2	92
Battle Creek, Mich.	184	3	145
Howell, Mich.	2		107
Jackson, Mich.	138	1	107
Lansing, Mich.	161	1	125
Lansing, Mich.	161	4	125

Route 1—Via N. Y. C. & St. L., Toledo, O., and N. Y. C. R. R.

Route 2—Via N. Y. C. & St. L., Toledo, O., and Ann Arbor R. R.

Route 3—Via N. Y. C. & St. L., Toledo, O., and M. C. R. R.

Route 4—Via N. Y. C. & St. L., Toledo, O., and P. M. Ry.

37535. To establish on agricultural limestone, C. L., in box cars, minimum weight 50,000 lb., from Carey, O., to points in Pennsylvania and New York, as described below:

Beginning at Buffalo, following the line of the Erie through Dayton to Salamanca, N. Y., thence via the line of the Pennsylvania through Kinzua, West Hickory, Tionesta, East Sandy, Foxburg, East Brady, Mosgrove, thence via the line of the P. & S. to Freeport; thence via the line of the Pennsylvania to Pittsburgh; thence via the line of the B. & O. through Bruceton, Washington; thence to the Ohio-Pennsylvania State Line. Proposed—202c N. T. Present—Class rates.

To destinations located on the line of the B. & L. E. R. R., from Girard, Pa., to Fredonia, Mercer, New Castle, Sharon, via the P. R. R.; to Sharpsville, Pymatuning through Shenango to Greenville via Erie R. R.; thence via line of the P. R. R. to North Girard. Proposed—189c N. T. Present—Class rates.

*Destination description corresponds with stations in New York and Pennsylvania as published in P. R. R. Tariff 129-A.

37536. To establish on slag (a product of iron and steel blast or open hearth furnaces), in open top car equipment, C. L., and on stone, crushed (in bulk), and limestone, unburned, agricultural (in bulk open top cars only), C. L., from Black Rock, Buffalo and East Buffalo, N. Y., to Van Buren, Brocton, Portland and Westfield, N. Y., rate of 80c per N. T. Present, 90c per N. T. on slag and on stone.

37537. To establish on dolomite, raw or crude and fluxing stone, C. L., from Narlo, O., to St. Louis, Mo., and East St. Louis, Ill., rate of 277c per G. T. Present, 315c per G. T.

37550. To establish on sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding and silica) and gravel, C. L., from Wolcottville, Ind., to Angola, Ind., rate of 80c per N. T. via P. R. R., Kendallville, Ind., N. Y. C. R. R.

37551. To establish on crushed stone, in bulk, in open top cars, C. L., Richmond, Ind., rate of 85c per N. T.

37558. To establish on stone, crushed (in bulk) and crushed stone screenings (in bulk) in open top cars, C. L., except when car is loaded to full cubical or visible capacity actual weight will apply, from East Liberty, O., to Lakeview, O., rate of 50c per N. T., to expire with Dec. 31, 1933.

Rock Products

37676. To establish on **sand**, C. L., Greenville, Henlein and Osgood, Pa.

	Present	Proposed
Batavia, N. Y.	247	340
Rochester, N. Y.	264	340

37552. To establish the following rates on **limestone**, **crushed**, **ground** or **pulverized**, in barrels, boxes or sacks, minimum weight 40,000 lb., from Carey and McVittys, O., to St. Paul, Winona and Duluth, Minn., and points in Wisconsin shown in Items 930 to 985, of C. F. A. L. Tariff 155-S, taking same rates as provided in C. F. A. L. Tariff 165-E, and also to other points shown in Item 995 of former tariff, from Carey, O., and McVittys, O. (Illustrations):

	Present	Carey	McVittys	Prop.
Duluth, Minn.	43	43	27	
St. Paul, Minn.	43	43	27	
Winona, Minn.	48	48	24	
Fond du Lac, Wis.	38	38	19	
Green Bay, Wis.	30	30½	21	
Madison, Wis.	38	38	20	
Oshkosh, Wis.	38	38	19	
Portage, Wis.	38	38	21	
Wausau, Wis.	38	38	23	

37557. To establish on **crushed stone**, **crushed stone screenings** and **agricultural limestone** (not ground or pulverized), in bulk, in open top cars, C. L., from Bellevue, O., to Boughtonville, O., rate of 70c per ton, via N. K. P., Kimball, O., and B. & O. R. R.

Illinois

7531. **Sand and gravel**, C. L., (See Note 1), from Barry, Ill. (Wabash), to stations on the B. & O. R. R., in Illinois, viz.: Bradfordton to Beardstown, Ill., inclusive, and Rochester to Sharpsburg, Ill., inclusive. Present, class basis or lowest combination. Proposed, \$1.01 per net ton.

3330-V. **Sand and gravel**, C. L., from Chillicothe, Ill., to T. P. & W. R. R. stations shown below:

To (Rep. Pts.)	Present	Proposed
Civer, Ill.	110	101
Scottsburg, Ill.	115	113
Disco, Ill.	120	113
Warsaw, Ill.	120	No change
Orchard Mines, Ill.	100	No change

3339. Crushed stone, coated with asphaltum, (See Note 3), but not less than 40,000 lbs., from Chicago, Ill., and points in the Chicago Switching district to Albion, Ill. Present, 23c per 100 lbs. Proposed, \$3.57 per net ton.

7541. Stone, crushed, coated with oil, tar or asphalt, C. L., (See Note 3), but not less than 40,000 lbs., from St. Louis, Mo., to various stations on the Wabash Ry. in Illinois. Rates per net ton, to representative points:

	Pres.	Prop.
Springfield, Ill.	\$1.88	\$1.42
Riverton, Ill.	1.76	1.42
Niantic, Ill.	1.53	1.42
Staunton, Ill.	1.43	1.42
Edwardsville, Ill.	1.32	1.32

Central

37836. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding and silica) and **gravel**, C. L., in open top cars, from Cleveland, O., to Lancaster, O., rates of 135c per net ton via P. R. R. direct.

73843. To establish on **common sand**, also **gravel**, in open top cars, C. L., from Kent Sand and Gravel Pit, O. (located two miles south of Kent, O.), to Leavittsburg, Braceville and Ravenna, O., rate of 60c per net ton.

37861. To establish on **crushed stone** and **crushed stone screenings**, C. L., from Marion, O., to New Lexington, O., rate of 105c per N. T. via C. & O. Ry., Lancaster, O., and P. R. R.

37781. To establish on **crushed stone**, C. L., and **sand** (other than blast, engine, core, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica), and **gravel**, in open top cars, C. L., (See Note 3), from Sandusky, O., to Norwalk, O., rate of 60c per net ton, via B. & O. R. R.-Monroeville, O.-W. & L. E. Ry. Present, 70 cents applies only on crushed stone and 80c per net ton applies only on sand and gravel.

37784. To establish on **agricultural limestone**, in box cars, C. L., minimum weight 50,000 lbs., from Gibsonburg and Woodville, O., to Chester, W. Va., rate of 202c per net ton via P. R. R. direct. Present, 230c per net ton.

37892. To establish on **sand** (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica) or **gravel**, in open top cars, C. L., (See Note 3), from Saegertown,

Pa., Butler, Pa., rate of 100c per net ton. Present, 15c (sixth class) per C. F. A. L. Tariff, I. C. C. 2453.

37816. To establish on **crushed stone**, **crushed stone screenings** and **agricultural limestone**, in open top cars, C. L., from Greencastle, Ind., to Angola, Ind., 400c per N. T. via P. R. R., Auburn Jet, Ind., and N. Y. C. R. R.

Southern

3128. **Stone**. Sou. Ry. quarries to Norwood Park, Ill. Cancellation. In order to eliminate conflicting rates to Norwood Park, Ill., it is proposed to cancel specific rates shown on page 50 of Southern Ry.'s I. C. C. A-9975, permitting the Chicago, Ill., rate to apply.

3207. **Sand**, C. L., Louisville, Ky., to Knoxville, Tenn. (Intrastate). Present rate, 55c per net ton. Proposed rate on sand, C. L. (See Note 3), from and to above named points, 40c per net ton (applicable only on intrastate traffic—expires June 30, 1934, unless sooner canceled, changed or extended).

3238. **Sand and gravel**, C. L., Jackson's Lake, Ala., to Montgomery, Ala. (Intrastate). Present rate, 50c. Proposed rate on sand and gravel, C. L., (See Note 3), from and to above named points, 33c per net ton (to expire April 27, 1934, unless sooner cancelled, changed or extended)—same as was in effect prior to September 4, 1933.

Western

1376. Rates, **sand**, **silica**, **pumice**, **volcanic ash**, C. L., as described in Item 6140-H, W. T. L. Tariff 18-M. (See Note 1), but not less than 60,000 lb., except where car of less than 60,000 lb. capacity is furnished at carrier's convenience, the marked capacity of car will apply. Rates in cents per 100 lb.

GROUP 1, ST. LOUIS		
From	Present	Proposed
Buffalo Park, Kan.	22	21½
Ellis, Kan.	22	21½
Hoxie, Kan.	22	21½
Johnstown, Kan.	22	21½
Kanopolis, Kan.	22	21½
Lindsborg, Kan.	22	21½
Morland, Kan.	22	21½
Natoma, Kan.	22	21½
Quinter, Kan.	22	21½
Wakeeney, Kan.	22	21½
Wilson, Kan.	22	21½
Winona, Kan.	34	22

From	Present	Proposed
Buffalo Park, Kan.	23	23
Ellis, Kan.	24	23
Hoxie, Kan.	24	23
Johnstown, Kan.	24	23
Kanopolis, Kan.	24	23
Lindsborg, Kan.	24	23
Morland, Kan.	24	23
Natoma, Kan.	24	23
Quinter, Kan.	24	23
Wakeeney, Kan.	24	23
Wilson, Kan.	24	23
Winona, Kan.	35	24

From	Present	Proposed
Buffalo Park, Kan.	24	23
Ellis, Kan.	24	23
Hoxie, Kan.	24	23
Johnstown, Kan.	24	23
Kanopolis, Kan.	24	23
Lindsborg, Kan.	24	23
Morland, Kan.	24	23
Natoma, Kan.	24	23
Quinter, Kan.	24	23
Wakeeney, Kan.	24	23
Wilson, Kan.	24	23
Winona, Kan.	37	24

1694-1. Rates, **sand**, **gravel** and **stone**, crushed, C. L., usual minimum weight, from Topeka, Kan., to Sabetha, Kan. Rates, present 90c per net ton. Proposed, 71c per net ton. No switching to be absorbed and rate to expire with Dec. 31, 1933.

8209-1. Rates—**Stone**, crushed, ground or pulverized, C. L., (See Note 2), but not less than 40,000 lb., from Hannibal and White Bear, Mo., and Quincy, Ill., to Nebraska points. Rates—Present—Combination rates usually. Proposed, to representative points, to Edgar, 2.50; Holdrege, 2.80; Plainview, 3.00; Sidney, 3.80.

Sup. 1 to 8132-1. **Rock**, asphalt, natural or coated with not to exceed 5% road oil; **stone**, crushed or ground; **sand** and **gravel**, from Topeka, Kan., to Kansas destinations. Please refer to Docket Bulletin No. 3587, dated Oct. 10, 1933, Docket No. 8132-1. This subject has now been cancelled from the docket.

8620. Rates—**Stone**, crushed. (See Note 3), from Wausau, Wis., to Manville, N. J. Rates—Present, 730c per net ton; proposed, 580c per net ton.

Sup. 1 to 1694-1. **Sand**, **gravel** and **stone**, crushed, C. L., usual minimum weight, from Topeka, Kan., to Sabetha, Kan. Please refer to Docket Bulletin No. 3595 dated Oct. 20, 1933, Docket 1694-1. This subject has now been cancelled from the docket.

1873-S. **Sand** (except asbestos sand and silica sand), C. L., (See Note 3), from Wichita, Kan., to Lorena, Kan. Rates: Present—56c per ton of 2,000 lb. Proposed—40c per ton of 2,000 lb., no switching to be absorbed. Same to apply as a terminal rate not applicable at intermediate points. (To expire six months after effective date.)

3089-N. **Limestone**, ground, C. L., (See Note 3), but in no case less than 40,000 lb., from Hannibal, Mo., to stations in Iowa. Rates to representative points:

To groups	Pres.	Prop.
Cedar Rapids	10½	9½
Mason City	13½	12
Des Moines	12½	10

(Complete copy of exhibit will be furnished on request.)

Southwestern

2188. **Sand**, **glass** or **silica**, from Wedron, Ill., to Bartlesville, Okla. To establish rate of 18c per 100 lb. on sand, glass or silica, C. L., (See Note 2), from Wedron, Ill., to Bartlesville, Okla. Present rate 22½c. Proposed rate same as applicable from Ottawa, Ill., to Guthrie, Okla.

2268. **Agricultural limestone**, from Atwood's Quarry No. 2, Mo., to points in Missouri. It is proposed to add Atwood's Quarry No. 2, Mo., a local point on the Wabash, at a point of origin in Item 1105-L, Sup. 71, W. T. L. Tariff No. 91.

Texas-Louisiana

8177. **Sand and gravel**, straight or mixed carloads, from Luxello, Tex., to San Antonio, Tex. Proposition from shippers to establish rate of 25c per ton on sand and gravel, straight or mixed carloads, (See Note 3), from Luxello, Tex., to San Antonio. Proposed rate to permit shippers located at Luxello, Tex., to meet competition of other pits nearby.

I. C. C. Decisions

15212. **Cement**. Fourth Section. By division 2. Colorado and Southern, et al., authorized to establish and maintain rates from Chanute, Kan., and Kansas City, Mo., and points grouped therewith, and from Superior, Neb., to stations on the Colorado and Southern in New Mexico, Clayton to Emery Gap, inclusive, the same as those applicable on like traffic over direct routes, provided that rates from and to intermediate higher rated points shall not exceed rates of scale IV in Western Cement Rates, 69 I. C. C. 644, and supplementary findings.

25376. **Cement**. By division 5. Medusa Portland Cement Co. vs. Ann Arbor Railroad Co., et al. Rate charged on a carload of cement from York, Penn., to Trident, Mont., found inapplicable. Reparation awarded.

14990. **Cement**. Fourth Section. By division 2. Authority granted conditionally to establish and maintain proportional rates on portland, natural or hydraulic cement, C. L., from St. Louis, Mo., and East St. Louis, Ill., to Ada, Okla., and Okay Junction, Ark., without observing the long-and short-haul provision of section 4.

15148. **Cement**. Fourth section. By division 2. Authority granted conditionally to establish and maintain rates on cement, straight or mixed carloads from Menominee, Mich., to Wisconsin and Michigan points without observing the fourth section long-and short-haul provision.

Pennsylvania Crushed Stone Producers Ask Questions

Complications of Furnishing State Highway Materials Are Difficult to Grasp

PRODUCERS probably will recall the rules and regulations issued last summer by the U. S. Bureau of Public Roads governing the expenditure of the \$400,000,000 emergency construction fund made available by the N. I. R. A. One of the specific points in these rules and regulations was that the work was to be done by contract and that contractors were to buy or make their own materials. Early rulings prohibited certain states from buying cement, or other materials, and furnishing it to contractors as they had previously done.

The State of Pennsylvania for the last two years or more has been doing most of its highway construction with day labor, and making or purchasing construction materials. By a recent ruling of the U. S. Bureau of Public Roads the state will be permitted to continue this practice in the spending of its share of the \$400,000,000 emergency fund. The idea is that the state may assume the role of contractor in its relation to the Federal government. The precedent having been established it is likely other states will do the same.

To govern highway construction under this arrangement new and complicated rules and regulations have been developed by the Pennsylvania State Highway Department under the title of "Special Provisions Applicable to Purchase of Material by the Commonwealth of Pennsylvania for National Recovery Projects to be Constructed by Department Forces." If other states take these rules and regulations as a guide, producers of highway materials elsewhere, as well as in Pennsylvania, are to be pitted.

At a meeting in Harrisburg, Penn., November 8, over 50 producers of crushed stone assembled under the auspices of the Pennsylvania Stone Producers' Association to discuss these provisions and to get an official interpretation of them from the director of standards and purchases, department of property and supplies, State of Pennsylvania.—F. H. Mason.

Practically Impossible to Quote F.O.B. Job

The procedure necessary to quote prices for material for these state force account jobs is (*A*) f.o.b. plant or shipping point, or f.o.b. railway or water destination; (*B*) f.o.b. job, that is unloading and/or delivering to the site of the work. A producer's interpretation of the rules and regulations, which interpretation the state director of purchases said was substantially correct, is as follows:

"To deliver in accordance with the above special provisions (*A*) (f.o.b. plant or shipping point or f.o.b. railroad or water destination), "the bidder need only certify that the plant from which the material is produced is operating under codes of fair competition as authorized under the National Recovery Act, or under the President's Re-employment Agreement.

"To deliver in accordance with the above special provisions (*B*) (f.o.b. job, that is, unloading and/or delivering material to the site of the work), it is not only necessary to certify that the material has been produced under codes of fair competition as authorized by the National Recovery Act or under the President's Re-employment Agreement, but that the material must be delivered in accordance with the special provisions as noted in circular M. P. N. R. P., and the best way to understand these provisions (*B*) is to follow through their requirements, which are as follows:

"Suppose the state awarded our XYZ Stone Co. an order to deliver 1000 tons of Pennsylvania No. 2 stone f.o.b. a job in B— county. Let us further suppose that this job is closer to our A— plant than any one of our other plants and that it can be trucked direct from our A— plant. In this case, we can, first, either deliver this with our own trucks, or second, we can hire some one else to do the trucking.

"In case we do the trucking ourselves with our own trucks, we would have to request and secure from the proper labor employment agency in B— county the names of truck drivers who meet the labor requirements as set forth in this circular. These truck drivers would be paid per hour at the rate designated by that county employment agency and these truck drivers would not be permitted to work more than 30 hours per week.

"A complete record of the wages paid to and the hours worked by these truck drivers would have to be kept on the job. These records, according to the circular, must be available upon the project. These two provisions would necessitate our sending one of our own pay roll clerks to each job and keeping him there until its completion.

"Upon completion of this work, we would have to submit to your county superintendent two copies of pay rolls in such form as may be prescribed by the Department of Highways for all work performed under this contract (whether done by the contractor or under a subcontractor, or otherwise), certified under oath by the contractor or his authorized representative, shall be filed with

the superintendent of the Pennsylvania Department of Highways, showing the name of each employee, the state and the county of his bona fide residence, the agency from which his name was obtained, whether or not a veteran with dependents, the kind of employment, the hours worked each day, the wage rate paid, the total amount earned and deductions for board and tools as hereinafter provided."

"In order to fulfill our obligation of this supposedly 1000-ton order from our A— plant, it would be necessary for us to carry out the provisions noted above. In fulfilling these requirements, it would cost the Commonwealth of Pennsylvania considerable extra money due to our cost of delivery, with its supervision and accounting, being considerably greater than the cost would be to the Commonwealth of Pennsylvania in handling the delivery with its own forces.

"In case this delivery was to be trucked from A— (located in B— county) to a county other than B— county, it would be necessary for us to go to the other county, let us assume V— county, and hire our truck drivers through the employment agency in that county.

"In the case that we did not do the trucking with our own trucks from A— plant to the projects, but hired some one else to do it, the following procedure would be necessary under the circular referred to: We would, first, have to secure written permission from the secretary of highways to subcontract the hauling of this material. Second, we would have to convince the secretary of highways that the trucker is experienced and equipped to do the work. If the secretary of highways did give us the right to subcontract this trucking, it would be necessary for us to hire trucks at a rental which must be fair and reasonable. During the last six weeks, the truckers in various counties in western Pennsylvania have made application to the Public Service Commission of Pennsylvania for permits to be common carriers of freight and under these permits they state the rate per hour and the rates per ton mile they will charge for unloading and trucking material in the stated county for which they are requesting the permits. Therefore, the fair and reasonable rate as referred would be construed differently by the truckers in different counties. Some might claim to us that the rates established by the Public Service Commission are the fair and reasonable rates. The rates specified in permits secured from the Public Service Commission do not apply to work done directly for the Commonwealth of Pennsylvania, therefore your department could hire trucks at rates lower than a commercial producer.

"The only procedure we could follow would be to hire trucks locally in each county, that is on this particular job referred to we would have to hire trucks from a truck owner in B— county. The next step would be to see that the truck owner enforced the requirements as to hours of

work and the rates of pay for the truck drivers and other labor employed in connection with the unloading. This responsibility remains with the contractors (in this case, ourselves); therefore, it would be necessary for us to keep on the job, records of daily pay rolls and information regarding truck drivers and labor used in unloading, for inspection by the Department of Highways. It would be also necessary for us to furnish at the end of each month, complete information regarding employment of truck drivers and helpers.

"Now let us suppose that we have secured a 1000-ton order for shipment f.o.b. the job, and this shipment must first move in railroad cars to be unloaded at a railroad destination. In a case of this kind we would not be in position to do the trucking ourselves, therefore we would have to hire someone else to do the trucking and our procedure would be as follows: We would have to secure written consent from the secretary of highways to sublet the unloading and delivering of this order. In making this request to the secretary of highways, we would have to prove that the subcontractor was experienced and equipped for such work.

"In case the secretary of highways gave us written permission to subcontract the unloading and delivering, we would have to hire trucks to do the work at a fair and reasonable rate. We would then have to see that our trucking subcontractor secured from the proper local employment agency names of truck drivers who were eligible for this work. The subcontractor, naturally, would have to be informed as to the special requirements of pay and hours of labor involved under the N.R.A. provisions. However, we would still have the responsibility of fulfilling your contract and it would be necessary for us to keep on the project records pertaining to the wages paid and hours employed of each man hired by the subcontractor and we would further have to furnish the highway department at the end of each month, the monthly wages paid together with such information as requested.

Conclusions: The underlying spirit in the circular M.P.N.R.P. is to discourage subcontracting. In practically all of the cases where unloading and delivering is requested f.o.b. the site of the work it would be necessary for the bona fide commercial producer to subcontract his trucking. It is possible for the bona fide producer to subcontract this unloading and delivering, but the high cost to the highway department for the extra services in carrying out the provisions of this circular will make it prohibitive when compared with the Department of Highways cost in doing this work itself. The loss of time and inefficiency of a producer to carry out all of the special provisions covering delivery, before starting such delivery would delay all other work on the project.

The Department of Highways is properly authorized and is already organized to take care of this work through its local super-

intendents. They are at the present time hiring trucks by the hour and pay the drivers of these trucks separately from the rental charge. The rental charges made by the Department of Highways would be considerably less than the prices given to commercial producers under the rules of this M.P.N.R.P. circular.

"We feel that it is entirely impractical for bona fide commercial producers to properly supervise and enforce the special provisions of the M.P.N.R.P. circular governing the unloading and/or the delivery of materials either from railroad or water destinations or from the plant itself. We further feel that the high cost makes it inadvisable for the Department of Highways to request bona fide commercial producers to make delivery of their materials beyond plant, or rail, or water destinations."

Producers Become Subcontractors

In answer to specific questions the following additional explanation of the M.P.N.R.P. circular was developed. When supplying stone to highway contractors for NRA jobs the producer is a subcontractor of the highway contractor; the highway contractor is responsible for seeing that the producer lives up to the provisions of the NRA rules and regulations.

The owner of a truck cannot drive his own truck unless he is certified for the job (he must be an unemployed veteran with dependents, if such are available) by the county employment agency of the NRA. If he owns a fleet of trucks he cannot use his regular drivers, but must fire them and employ drivers certified by the county employment agency of the NRA in the county where the job is. (The effect of this ruling on truck insurance rates was pointed out. One producer suggested that it would be cheaper for the truck owner to let his own driver operate the truck and accept the government employment agency appointee as a paid passenger; which at least would insure capable operation of a piece of equipment worth several thousand dollars.) Truckers cannot operate outside their own county unless they get certification in the adjoining county they wish to operate in; this may mean changing drivers at every county line.

The bidder on Federal financed jobs must designate in his bid from what quarry or quarries the material will be furnished, and he will not be allowed to ship from any others. The state highway department is requesting bids f.o.b. quarry, f.o.b. railroad destination and f.o.b. job, and it reserves the right to make the award on any one of the three prices. It is not necessary for the producer to quote f.o.b. job to have his bid legal; he must, however, show his f.o.b. plant price in all bids.

The distinction between a commercial plant and a roadside plant is going to be difficult to draw in some instances. For example, if a plant has operated for years but has been shut down during the recent depression and

is reopened to handle a specific road job (NRA) it will be classed as a roadside operation. Shipments from a stock pile accumulated by a previously operated commercial plant will be considered commercial plant production.

[The distinction between a commercial plant and a roadside plant is an important one, because the roadside plant operator must obtain all his labor from the county NRA employment bureau; and his workmen are limited to a 30-hour week. The commercial operator's plant force is his own and can be employed a 40-hour week.—The Editor.]

P. B. Reinhold Elected Secretary

Other business done at the meeting was to elect Paul B. Reinhold, Pittsburgh, Penn., secretary-treasurer, A. W. Chilton, former executive secretary, having resigned.

The meeting was one of the largest ever held, and the work of the association was highly commended by many producers.

Southern Sand and Gravel Rates Canceled

RAILROADS involved in the Interstate Commerce Commission docket case No. 3625 have been ordered by the commission to cancel sand, gravel, slag, stone and chert rates developed through prior applications not later than December 19. The proceeding is discontinued as of November 27 with two of the commissioners dissenting from the general terms of the order.

This case was a reopening of old proceedings in which the southern carriers asked for a scale that would apply to all hauls as against joint line haul provisions. Commissioner McManamy, dissenting, said he could not agree with the conclusion that "the arbitrary for joint-line hauls of 500 miles or less should be continued on this traffic."

The above decision was the fourth of a series issued by the commission in connection with its latest hearing on docket case No. 17517. Commissioners found that evidence failed to justify prescription of one scale of rates in lieu of the two scales now in use in Georgia, one for single line and the other for joint line application, approved in the original proceedings and now generally prevailing throughout the south on sand, gravel, crushed stone and allied commodities.

The commission further found "not justified" discontinuance of the authority granted in the original proceeding to short and weak lines to charge an arbitrary rate of 25c a ton in addition to standard line scales. A further finding was that no justification had been shown for modification of original provisions in the matter of rates on sand, gravel, crushed stone, etc., within the boundaries of South Carolina.

Gypsum Publication

Gypsum in 1931—Data on the gypsum industry as compiled by the Bureau of Mines, Washington, D. C.

Code of the Crushed Stone, Sand, Gravel and Slag Industries Became Law November 20

After Much Redrafting the Prime Essentials of the Original Draft Remain

THE long drawn out process of establishing a Code of Fair Practices for the Crushed Stone, Sand and Gravel and Slag Industries ended November 10 when the final draft was approved by President Roosevelt. The code became effective November 20 and is now the law of the land. We would hesitate to say how many times the code was redrafted, but the code committee of the industry stuck to their job with unparalleled patience and tenacity; and while the language of the final draft bears little resemblance to the original adopted by the convention of the industries in Chicago last July, it appears to have retained most of the things the industry wanted.

In transmitting the code to the President with recommendation for approval, National Recovery Administrator Johnson wrote: "The crushed stone, sand and gravel, and slag industries have in the past lacked any great degree of coordination, although each one has had its national trade association, active in engineering and economic research, which has been of benefit, it is believed, not only to the association members, but also to the industries at large and to the consuming public. In working out this Code, the three industries propose a new form of cooperation, which has been expanded to include the producers of stone, sand, and gravel from local quarries or wayside pits. The inclusion of these local producers, doing business mostly with portable machinery and equipment, has developed special problems, which have been carefully considered from all angles in the evolution of the Code since the public hearing."

THE CODE **Article I—Purposes**

To effectuate the policies of Title I of the National Industrial Recovery Act, the following provisions are established as a Code of Fair Competition for the Crushed Stone, Sand and Gravel, and Slag Industries and for such other Industries as with the approval of the President may be governed by its provisions, and shall be binding upon every member thereof.

Article II—Definitions

SECTION 1. Industries.—The term "industries" as used herein includes the quarrying, and/or crushing, and/or processing, and/or recovering of stone, sand, gravel, and/or slag for any or all purposes, and the producing and/or processing for any or all purposes of the products of other such industries as with the approval of the President may from time to time be governed by the provisions of this Code.

SEC. 2. Employee.—The term "employee" as used herein includes any person engaged

in the industries in any capacity receiving compensation for his services, irrespective of the nature or method of such compensation.

SEC. 3. Employer.—The term "employer" as used herein includes anyone by whom any such employee is compensated or employed.

SEC. 4. Member of the Industries.—The term "member of the industries" as used herein includes anyone engaged in the industries as above defined, either as an employer or on his own behalf.

SEC. 5. Producers.—(a) Crushed Stone Producer.—The term "crushed stone producer" as used herein includes any member of the industries engaged in the quarrying, and/or crushing, and/or processing of stone for any or all purposes.

(b) *Sand and Gravel Producer.*—The term "sand and gravel producer" as used herein includes any member of the industries engaged in the recovering and/or processing of sand, and/or gravel for any or all purposes.

(c) *Slag Producer.*—The term "slag producer" as used herein includes any member of the industries engaged in the recovering and/or processing of slag resulting from furnace or smelting operations for any or all purposes.

(d) *Registered Producer.*—The term "registered producer" as used herein includes any producer as above defined, who has assented to this Code and has complied with the other provisions of Section 4 (c) of Article VI of this Code.

SEC. 6. Region.—The term "region" as used herein includes any one of the several parts of the United States established as hereinafter set forth in Article VI of this Code.

SEC. 7. District.—The term "district" as used herein includes any subdivision of any region or regions established as provided for hereinafter.

SEC. 8. Division.—The term "division" as used herein includes those members of the industries engaged primarily in the production of one type or class of industry products, so specialized in nature as to warrant the establishment of a division.

SEC. 9. Marketer.—The term "marketer" as used herein includes any registered producer selling products of the industries in any district.

SEC. 10. Effective Date.—The term "effective date" as used herein shall mean the beginning of the tenth day after the approval of this Code by the President.

SEC. 11. President, Act, and Administrator.—The terms "President," "Act," and "Administrator" as used herein shall mean respectively the President of the United States, the National Industrial Recovery Act, and the Administrator of Title I of said Act.

Article III—Hours

SECTION 1. Working Time.—No employee, except as set forth in this Article and in Article IV, shall be permitted to work in excess of forty (40) hours in any one week.

SEC. 2. Exceptions.—The maximum hours specified in Section 1 of this Article shall not

apply to commercial travelling salesmen; or to employees engaged in executive or managerial or clerical capacities who receive not less than \$35.00 per week; or to the following employees:

(a) Employees working as crews on floating equipment engaged solely in dredging and/or transportation on navigable waters, provided the Code Authority as set up in Article VI of this Code shall prepare and submit, not later than January 1, 1934, a schedule of minimum wages and maximum hours for such employees, and upon the approval of the Administrator such schedule shall at once become effective.

(b) Employees engaged in clerical or office work, provided the total working hours of such employees shall not exceed forty-two (42) hours per week averaged over any three (3) months in any six (6) months' period, or six (6) days in any one week.

(c) Employees engaged in outside delivery service, provided the total working hours of such employees shall not exceed forty-eight (48) hours in any one week.

(d) Employees engaged in emergency repair work involving breakdowns or protection of life or property, comprising not more than five (5) percent of the total number of employees, provided the total working hours of such employees shall not exceed forty-eight (48) hours in any one week.

(e) Employees engaged as watchmen, provided the total working hours of such employees shall not exceed sixty (60) hours in any one week.

Article IV—Wages

SECTION 1. Rates of Pay.—(a) No employee, except as hereinafter set forth, shall be paid at less than the hourly rates specified in the following schedule which is made a part of this Code:

(1) Alabama, Florida, Georgia, Mississippi, South Carolina	\$0.25
(2) Arizona, Arkansas, Kentucky, Louisiana, New Mexico, North Carolina, Oklahoma, Tennessee, Texas, Virginia, West Virginia east .....	.30
(3) California, Colorado, Connecticut, District of Columbia, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Dakota, Ohio including all operations on Ohio River, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Washington, West Virginia west, Wisconsin, Wyoming .....	.40

(b) For the purposes of paragraph (a) of this section, "West Virginia east" shall be the part of West Virginia south and east of a straight line drawn between the intersection of the boundaries of the states of Kentucky, Virginia, and West Virginia and the point farthest south on the western boundary of Maryland; and "West Virginia

"west" shall be the remainder of the state of West Virginia.

(c) Employees engaged solely as water boys, comprising not more than four (4) percent of the total number of employees (but in any case there may be at least one water boy) may be paid at not less than eighty (80) percent of the hourly wages prescribed herein.

(d) This section establishes a minimum rate of pay, regardless of whether an employee is compensated on a time rate, piece-work, or other basis.

(e) To the extent practicable, weekly earnings shall not be decreased, notwithstanding that hourly work may be reduced, and rates of pay for occupations in excess of the minimum herein prescribed shall be increased so as to maintain differences in full time weekly earnings existing on July 15, 1933.

(f) No employee working on an hourly basis shall be paid less than one and one-third times his hourly rate, for all time in excess of the maximum weekly hours prescribed herein.

SEC. 2. Salaried Employees.—(a) No accounting, clerical, or office employee shall be paid less than the rate of \$15.00 per week in any city of 500,000 or more population, or in the immediate trade area of such city; or less than the rate of \$14.00 per week in any city between 100,000 and 500,000 population, or in the immediate trade area of such city; or less than \$13.00 per week in any city between 2,500 and 100,000 population, or in the immediate trade area of such city; or less than \$12.00 per week in any city under 2,500 population. Population for the purposes of this paragraph shall be determined by reference to the 1930 Federal Census.

(b) No watchman paid on a weekly basis shall be paid at less than the rate of \$13.00 per week in the States listed in paragraphs (1) and (2) of Section 1 (a) of this Article; or at less than the rate of \$14.00 per week in the States listed in paragraph (3) of Section 1 (a) of this Article.

SEC. 3. Method of Payment.—(a) An employer shall make payment of all wages due in lawful currency or by negotiable check therefor, payable on demand. Wages of employees paid on an hourly basis shall be paid at least twice a month and salaries at least once a month. These wages shall be exempt from any payments for pensions, insurance, or sick benefits other than those voluntarily paid by wage earners.

(b) The employer or his agents shall accept no rebates, directly or indirectly, on such wages nor give anything of value or extend favors to any person for the purpose of influencing rates of wages or the working conditions of his employees.

Article V—Labor Provisions

SECTION 1. Child Labor.—No person under sixteen (16) years of age shall be employed in the industries, or anyone under eighteen (18) years of age at operations or occupations hazardous in nature or detrimental to health. The Code Authority as hereinafter established shall submit to the Administrator not later than January 1, 1934, a list of such occupations. In any State an employer shall be deemed to have complied with this provision if he shall have on file a certificate or permit duly issued by the authority in such State empowered to issue employment or age certificates or permits showing that the employee is of the required age.

SEC. 2. Rights of Labor.—(a) Employ-

High Lights of Code

(1) *Includes all producers of crushed stone, sand, gravel, slag for all purposes, both operators of permanent and of portable plants.*

(2) *Divides the United States into 16 administrative regions; which may be further subdivided into as many "marketing districts" as necessary.*

(3) *Provides for special divisions of producers, as for example, industrial sand operators, with practical self-government within the divisions.*

(4) *A Code Authority of somewhere between 48 and 60 members, a majority of which are elected as district representatives; to include also representatives of the NRA (non-voting).*

(5) *An Executive Committee of 15, evenly divided among the various industries; the representatives of the NRA also serve on this executive committee.*

(6) *All committee members have one vote each.*

(7) *Election of committee members partly by popular vote and partly by vote weighted according to average annual production.*

(8) *All controversies involving labor or consumers which cannot be settled by Code Authority to be arbitrated by special board.*

(9) *Uniform cost-keeping to be established; open price plan may be adopted by districts; no producer may sell any product for less than prime plant (out-of-pocket) cost of that product plus 10%.*

(10) *No increase in productive capacities allowed in "permissive areas" where a state committee finds present facilities ample.*

health and safety of his employees while engaged in the discharge of their duties. He shall protect his employees by workmen's compensation insurance, according to the amounts required in the State of jurisdiction or the United States Employees' Compensation Insurance, if that State has not established a compensation scheme for these industries.

SEC. 4. Accident prevention.—Every producer governed by this Code shall lend his cooperation and active support to the program of his trade association for the reduction of accidents in the conduct of his operations. No producer shall be permitted to expose his employees to unnecessarily dangerous working hazards and cases of culpable disregard of the life and health of employees shall constitute a violation of this Code. The Code Authority as hereinafter established shall present to the Administrator within six months after the effective date, such standards of safety as in its judgment will further the purposes of this section.

SEC. 5. Company facilities.—(a) Employees other than maintenance or supervisory men, or those necessary to protect the property, shall not be required, as a condition of employment, to live in homes rented from the employer.

(b) No employee shall be required, as a condition of employment, to trade at the store of the employer.

Article VI—Administration

SECTION 1. Regions.—For the purpose of administration of this Code, the United States shall be divided into sixteen regions as indicated in the following tabulation, which is hereby constituted and made a part of this Code. The Code Authority as hereinafter provided may from time to time revise such region or regions affected, subject to the approval of the Administrator.

Region No. 1.—Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island.

Region No. 2.—New York.

Region No. 3.—Pennsylvania, New Jersey, and Delaware.

Region No. 4.—West Virginia, Virginia, Maryland, and District of Columbia.

Region No. 5.—South Carolina, Georgia, Alabama, Florida, and Mississippi.

Region No. 6.—North Carolina, Kentucky, and Tennessee.

Region No. 7.—Arkansas, Louisiana, and Texas.

Region No. 8.—Ohio.

Region No. 9.—Illinois and Indiana.

Region No. 10.—Michigan and Wisconsin.

Region No. 11.—North Dakota, South Dakota, and Minnesota.

Region No. 12.—Nebraska and Iowa.

Region No. 13.—Kansas, Missouri, and Oklahoma.

Region No. 14.—Wyoming, Colorado, New Mexico, Utah, and Arizona.

Region No. 15.—California and Nevada.

Region No. 16.—Montana, Washington, Oregon, and Idaho.

SEC. 2. Districts.—Each region may be divided into subdivisions which shall be known as districts, to facilitate local organization, to administer this Code and to provide self-determination of local issues within the provisions of this Code and subject to the rulings of the regional committee and/or the Code Authority. Such districts may be

established by the marketers in any marketing area subject to the approval of the regional committee. When a marketing area is situated in more than one region, a district may be established subject to approval of the regional committees affected.

SEC. 3. Divisions.—Any group of members of the industries, after submitting to the Administrator proof that they represent two-thirds of the production, or two-thirds of the producers, or any one type or class of industry products, so specialized in nature as to warrant the establishment of a division, and that they are primarily engaged in the production of such specialized products, may petition the Administrator to constitute such members a division of the industries or of any one industry governed by the provisions of this Code. Upon such submission of proof and the receipt of such petition, the Administrator, after such hearing as he may prescribe, and after securing the recommendation of the Code Authority, may designate such members and all those in their class a division of the industries. Such members shall be governed by the provisions of this Code, with such exceptions as may be approved from time to time by the Code Authority and the Administrator.

SEC. 4. Committees.—(a) *Code Authority.*—To effectuate the policies of the Act a Code Authority is hereby constituted to cooperate with the Administrator in the administration of this Code. The Code Authority shall consist of:

(1) One (1) member representing the crushed stone industry and one (1) member representing the sand and gravel industry from each region, and also one (1) member representing the slag industry from each region in which slag is produced.

(2) Twelve (12) members at large, of whom at least one (1) shall be chosen from Regions 1, 2, and 3 as hereinbefore specified; at least one (1) from Regions 4, 5, 6, and 7; at least one (1) from Regions 8, 9, and 10; and at least one (1) from Regions 11, 12, 13, 14, 15, and 16.

(3) The president and one association staff representative to serve as ex officio members, of each trade association truly representative of any industry that with the approval of the President may from time to time be governed by the provisions of this Code. Such associations are hereby initially designated as the National Crushed Stone Association, Inc., the National Sand and Gravel Association, Inc., and the National Slag Association, or such successor associations as may be constituted by action of the members thereof.

(4) Representatives, selected by an equitable method to be approved by the Administrator, of such industries as with the approval of the President may from time to time be governed by the provisions of this Code.

(5) The President may appoint (from one to three) nonvoting members to the Code Authority as representatives of the Government. They are to be appointed for terms of from six months to one year, and if more than one is appointed, their terms are to be arranged so that they do not expire at the same time.

(b) In order that the Code Authority and/or the committees established herein shall at all times be truly representative of the industries as defined in Article II hereof and of such other industries as with the approval of the President may from time to time be governed by the provisions of this Code, and in other respects comply with the provisions of the Act, the Administrator may provide such hearings as he may deem

proper; and thereafter if he shall find that the Code Authority and/or the committees established herein are not truly representative or do not in other respects comply with the provisions of the Act, may require an appropriate modification in the method of selection of the Code Authority and/or such committees.

Members of the Code Authority representing each region shall be elected by the regional committees of their respective regions. The elected members and the ex officio members shall elect the twelve representatives at large. The Chairman of the Code Authority shall be selected by the full Code Authority from its membership.

Members of the Code Authority shall serve for one (1) year from the effective date, or until their successors are elected for a like term.

(c) *Registered Producers.*—Any member of the industries as defined in Article II hereof, or producers in other industries that with the approval of the President may from time to time be governed by the provisions of this Code, shall be entitled to participate in and share the benefits of the activities of the Code Authority and of other committees established herein and to participate in the selection of members thereof by assenting to and complying with the requirements of this Code and sustaining their reasonable share of the expenses of its establishment and administration. The reasonable share of these expenses shall be determined by the Code Authority, subject to review by the Administrator, on the basis of volume of business and/or such other factors as may be deemed equitable to be taken into consideration. Such a participant in the Code activities is hereinafter referred to as a "registered producer."

(d) *Regional Committees.*—The registered crushed stone, sand and gravel, and slag producers in each region in which they are producing materials shall elect in the manner prescribed in Section 7 (c) of this Article, an even and like number from their respective industries consisting of not less than four (4) nor more than ten (10) to the regional committee. The members so elected by each of these industries shall elect one (1) additional member from each of these industries to the regional committee.

This committee shall be equitably representative of the small, intermediate, and large producing companies of each industry within the region, with not more than one (1) representative from a single company, except that a producer may have more than one (1) but not more than three (3) representatives in order to give voting parity to the industry or industries represented by that producer. This committee shall also be elected with due regard to representation from each of the states composing the region.

Members of a regional committee shall serve for one year from the effective date, or until their successors are elected for a like term.

(e) *District Committees.*—The registered crushed stone, sand, and gravel, and slag producers in each established district in which they are marketing, shall elect, in the manner prescribed in Section 7 (d) of this Article, an even and like number from their respective industries consisting of not less than two (2) nor more than six (6) to the district committee. The members so elected by each of these industries shall elect one (1) additional member from each of these industries to the district committee.

This committee shall be equitably representative of the small, intermediate, and large producing companies marketing within

the district, with not more than one (1) representative from a single company, except that a producer may have more than one (1) but not more than three (3) representatives in order to give voting parity to the industry or industries represented by that producer or producers.

Members of a district committee shall serve for one year from the effective date, or until their successors are elected for a like term.

(f) *Division Committees.*—The registered producers in any division shall elect, in the manner prescribed in Section 7 (e) of this Article, a division committee. This committee shall be equitably representative of the small, intermediate, and large producers within the division, with not more than one (1) representative from a single producer.

Members of a division committee shall serve for one (1) year from the effective date, or until their successors are elected for a like term.

SEC. 5. Duties of Committees.—(a) *Duties of Code Authority.*—The Code Authority shall be the general planning, coordinating, and administrative agency for the industries governed by this Code and shall adopt such rules and regulations as, in its judgment, and subject to modification or disapproval by the Administrator, are necessary for the proper administration of the Code.

Without limiting the foregoing, the Code Authority shall have the following specific powers, subject to disapproval or modification by the Administrator:

(1) To obtain from members of the industries, periodically, or as often as it may direct, reports on wages, hours of labor, conditions of employment, number of employees, production, shipments, sales, stocks, prices, and other matters pertinent to the provisions or operation of this Code, sworn or unsworn as it may specify, or as the Administrator may from time to time require.

(2) To delegate to the regional, district, or division committees the authority to collect from members of the industries, in such regions, districts, or divisions such information and data as may be necessary for such committees properly to administer this Code; provided, however, that such information and data shall be held as confidential information by such committees, except that such information and data shall be available to the Code Authority and the Administrator.

(3) To delegate to the trade associations of the industries governed by this Code or to such subcommittees or such other agents or agencies as it may designate such of the administrative powers as may practicably be performed by them, and properly to compensate them therefor; provided, however, that such delegation shall not relieve the Code Authority of responsibility, and provided further that in the performance of any such delegated functions, such trade associations, subcommittees, or other agents or agencies shall comply with all applicable provisions of this Code.

(4) To keep accurate records and accounts of the expenses incident to the establishing and administering of this Code, and of doing such other things as it may have been, or may be, authorized or instructed by the Administrator to do; and to render from time to time such reports to the various committees and members of the industries as may in the judgment of the Code Authority seem proper.

(5) To provide for the collection at intervals of funds to cover these costs and expenses and to designate through what agency and in what manner they shall be

Rock Products

collected, subject, however, to the provisions of Section 4 (c) of this Article.

(6) To collect and furnish to governmental agencies such statistical information as the Administrator may deem necessary for the purposes recited in Section 3 (a) of the Act.

(7) To establish from its own membership an Executive Committee which, in the interim between meetings of the Code Authority, shall have all of the powers and authority of the Code Authority. This Executive Committee shall consist initially of not more than fifteen (15) members from the industries governed by this Code, and shall be equally and equitably representative of such industries. The representatives of the Government appointed as provided in paragraph (5) of Section 4 (a) of Article VI of this Code may also serve on the Executive Committee. The Code Authority may enlarge the Executive Committee in order to provide for equitable representation of such industries as with the approval of the President may from time to time be governed by this Code.

The Executive Committee shall refer for hearing and determination questions exclusively affecting any particular industry or industries to the members of the committee representing the industry or industries, respectively. Such members shall then act as a subcommittee with power to hear and determine the question under consideration for the entire Executive Committee. The members of the Executive Committee shall serve until their successors are elected.

(8) To make such inquiries and investigations and to hold such hearings as to the operation of this Code upon the complaint of interested parties, or upon its own initiative, as may be necessary properly to administer the provisions of this Code.

(9) To appoint regional committees in any region or regions where committees are not elected pursuant to the provisions of this Code within thirty (30) days after the effective date. Any regional committee thus appointed shall hold office only until a regional committee for that region has been elected and qualified in accordance with the provisions of this Code.

(10) To establish or designate an agency on planning and fair practice which shall cooperate with the Code Authority in developing fair inter and intra trade practices and industrial planning, including the regularization of employment and stabilization of employees for the industry.

(b) *Duties of Regional Committees.*—The regional committees shall administer the provisions of the Code in their respective regions, provided, however, that their acts be reviewed by the Code Authority and subject to its disapproval or modification, and may be reviewed and disapproved or modified by the Administrator. Each regional committee shall refer for hearing and determination questions exclusively affecting any particular industry or industries to those members of its committee elected thereon by said industry or industries respectively. Such members shall then act as a subcommittee with power to hear and determine the question in dispute for the entire regional committee subject to the right of appeal as hereinafter set forth.

The regional committee shall maintain the authoritative list of registered producers in each region. Each registered producer shall sign a certificate of compliance with this Code, and shall report such data as to production as may be required by the committee. The regional committee shall not continue the name of any producer on the list

who has failed to pay his proportionate share of the expense incidental to the establishment and administration of this Code as provided for in Section 4 (c) of this Article.

(c) *Duties of District Committees.*—The district committee shall administer the provisions of this Code in their districts, provided, however, that their acts be reviewed by their respective regional committees and subject to their disapproval or modification. The acts of such district committees may be reviewed and disapproved or modified by the Administrator. Each district committee shall refer for hearing and determination, questions exclusively affecting any particular industry or industries to those members elected thereon by the said particular industry or industries respectively. Such members shall then act as a subcommittee with power to hear and determine the question in dispute for the entire district committee subject to the right of appeal as hereinafter set forth.

(d) *Duties of Division Committees.*—Each division committee shall have power of self-government in respect to all conditions and problems relating exclusively to said division. It may establish territorial and other subcommittees, and prescribe such duties, rules, and regulations as are deemed necessary to carry out the purposes of the Act and of this Code. The right of appeal from the decisions of a subordinate committee to the next higher committee, to the Code Authority and to the Administrator, is hereby established. Furthermore, the Administrator shall have the right directly to review and disapprove or modify any action of any committee or subcommittee. Any such division committee may present to the Code Authority and to the Administrator recommendations designed to supplement the provisions of this Code, insofar as they relate to the members and operation of such division. Upon approval by the President after such notice and hearing as he may prescribe, such recommendations shall have full force and effect and shall be considered as an integral part of this Code.

SEC. 6. Interregional Regulations.—Proposals in respect to the administration of this Code affecting more than one region may be made to the Code Authority by the regional committee of any affected region, and the decision of the Code Authority shall be conclusive, subject, however, to the powers reserved herein to the Administrator.

SEC. 7. Voting—(a) Committees.—Each member of the Code Authority, the regional committees, the district committees, the state committees, and the division committees, shall be entitled to one vote in the proceedings thereof, and a majority vote shall govern.

(b) *Producers.*—Each registered producer as defined in Section 4 (c) of this Article shall be entitled to one vote, except as otherwise provided in this section; provided any such producer who within one year prior to the effective date has sold and shipped the products of any or all the industries governed by this Code may vote individually and separately as a member of any or all of such industries.

(c) *Meeting and Voting Within a Region.*—A meeting of producers within a region may be called at the instance of producers representing 25 percent of the production within a region, or representing 25 percent of the number of producers within a region, or at the call of either the regional committee or the Code Authority. The registered producers of each industry shall vote for members to represent their industry, as follows: An agreed upon number of representatives of each industry

shall be elected by the registered producers of the respective industries, each of whom shall have one vote irrespective of production. A like number of representatives of each industry shall be elected by the registered producers of the respective industries who shall vote in accordance with their average annual production sold and shipped during the five preceding calendar years. In the event a registered producer has not been producing material throughout the five preceding calendar years his basis of voting shall be determined as the average annual rate of production sold and shipped during his period of operation, provided that his period of operation has been more than one calendar year. In the event that he has operated less than one calendar year then he shall be entitled to as many votes as is equal to his production sold and shipped in tons or cubic yards according to established practice divided by 25,000. Each producer shall have one vote for each 25,000 units or major fraction thereof of average annual production sold and shipped. The unit in each case shall be in accordance with established practice within the region. After the representatives of each industry have been elected in the manner above set forth they shall elect from their industry one additional member. Except for the election of the regional committee all of the voting shall be on the basis that each registered producer shall have one vote.

(d) *Meeting and Voting Within a District.*—A meeting within a district may be called at the instance of marketers representing 25 percent of the production sold and shipped within the district or representing 25 percent of the number of producers marketing within the district, or at the call of either the district committee or the regional committee. The marketers of each industry shall vote for members who shall represent their industry as follows: An agreed-upon number of representatives of each industry shall be elected by the marketers of that industry, each of whom shall have one vote irrespective of delivered sales. An equal number of the representatives of each industry on the district committee shall be elected by the marketers of that industry, who shall vote in accordance with their average annual production sold and shipped within the district for the five preceding calendar years. In the event a marketer has not been selling materials within a district throughout the five preceding calendar years his basis of voting shall be determined as the average annual production sold and shipped in tons or cubic yards during the period he has been selling in the district. Each marketer shall have one vote for each 25,000 units or major fraction thereof of average annual sales. The unit in each case shall be in accordance with established practice within the district. After the representatives of each industry have been elected in the manner herein set forth they shall elect from their industry one additional member. Except for the election of the district committee, all of the voting shall be on the basis that each marketer shall have one vote.

(e) *Meeting and Voting Within a Division.*—A meeting within a division may be called at the instance of producers representing twenty-five (25) percent of the production, or representing twenty-five (25) percent of the producers within the division, or at the call of the Code Authority. The registered producers shall vote for members of the committee to represent their division, in such number and upon such equitable basis as may be approved by the Administrator.

SEC. 8. Right of Appeal.—Appeal from any decision by a district committee may be taken to the regional committee or commit-

tees of the region or regions in which such district is located. Appeal from any decision by a regional or division committee may be taken to the Code Authority or its accredited representative. The decision of the Code Authority or its accredited representative shall be final except for appeal to the Administrator. Any producer may exercise the right of appeal as herein provided from any decision affecting the interests of such producer. Questions on original hearing or an appeal exclusively affecting any particular industry shall in every instance be referred for hearing and determination to those members of the committee elected thereon by said particular industry or industries, respectively.

SEC. 9. Arbitration.—Complaints or controversies, involving labor, the consuming interests, or groups outside of the industries which cannot be satisfactorily settled by the Code Authority may, with the consent of the interested parties, be referred to an arbitration board composed of equal representation from each of the groups involved in the complaint or controversy, together with a neutral arbiter selected by the appointed members of the arbitration board. The decision of the arbitration board shall be final.

SEC. 10. Administration Expenses.—All of the costs and expenses of establishing and administering this Code shall be borne by the registered producers in the industries governed by this Code. It is hereby agreed by and between such producers, and each for himself and with the Code Authority, that each such producer shall pay at the time required such assessments covering the aforesaid cost as may be required by the Code Authority. The Code Authority may appoint such agents or agencies as it may designate for the collection of these assessments. These costs as herein referred to shall be equitably distributed among the registered producers in the various industries by the Code Authority, in conformity with Section 4 (c) of this Article.

SEC. 11. Trade Association.—Each trade or industrial association directly or indirectly participating in the selection or activities of the Code Authority shall: (1) Impose no inequitable restrictions on membership; and (2) submit to the Administrator true copies of its articles of association, bylaws, regulations, and any amendments when made thereto, together with such other information as to membership, organization, and activities as the Administrator may deem necessary to effectuate the purposes of the Act.

Article VII—Trade Practices

SECTION 1. Unfair Methods.—The following practices constitute unfair methods of competition for members of the industries and are prohibited.

(a) *Secret Rebates.*—To make secret prepayment of transportation charges or permit the payment or allowance of secret rebates, refunds, credits, or unearned discounts, whether in the form of money or otherwise, or extending to certain purchasers special service or privilege not extended to all purchasers under like terms and conditions.

(b) *Contract Interference.*—To interfere wilfully with anyone by any means or device whatsoever, in any existing contract or order between a seller and a purchaser in or concerning the production, manufacture, transportation, purchase, or sale of any industry product or the performance of any contractual duty or service connected therewith, with the intent and/or effect of thereby destroying or appropriating in whole or in part the property or business of another engaged in the industries governed by this Code.

(c) *Defamation.*—To defame a competitor by words or acts, falsely imputing to him dishonorable conduct, inability to perform contracts or questionable credit standing, or by the false disparagement of the grade or quality of his material.

(d) *Misrepresentation.*—To sell or offer for sale any industry product in such manner as knowingly to deceive purchasers or prospective purchasers as to the quality, quantity, size, grade, or substance of such product.

(e) *Misbranding.*—To mark or brand any product of the industry for the purpose or with the effect of misleading or deceiving purchasers with respect to the quality, quantity, size, grade, or substance of such product.

(f) *Commercial Bribery.*—To offer or give commissions, prizes, gifts, excessive entertainment, or other benefits as an act of commercial bribery to anyone in connection with the sale, purchase, or use of any industry product, or as an inducement thereto.

(g) *Lump-Sum Bidding.*—To sell any industry product except on a unit-price basis.

(h) *Contingent Selling.*—To enter into any agreement for furnishing any industry product contingent upon the sale or purchase of any other product or service, or other contingency not appearing in the contract.

(i) *Jobbers and Distributors.*—Since the great volume of industry products is sold by producers direct to consumers no producer indirectly shall violate this Code by disposing of his industry products through a middleman whom he controls by stock ownership or otherwise and who does not adhere to the standards of fair competition established in this Code.

SEC. 2. Cost Determination.—(a) Within 120 days after the effective date, the Code Authority shall establish, subject to the approval of the Administrator, a standard uniform accounting and costing system for each industry governed by the provisions of this Code.

(b) When approved by the Administrator full information concerning such uniform standard systems shall be distributed by the Code Authority to all members of the industries. Thereafter each member shall adhere to the standard uniform system for the industry or industries in which he is engaged to the extent of incorporating in his calculations of cost all of the elements prescribed by such system.

(c) Any district committee may, if it so elects, and subject to the approval of its regional committee and the Code Authority, adopt for the producers selling within that district, the open-price policy prescribed in paragraphs (d) and (e) of this section.

(d) No producer selling within a district described in paragraph (c) of this section shall sell any product at less than his prime plant cost thereof, plus ten (10) percent. Such cost shall be computed in accordance with the standard uniform accounting and costing system for the industry in which the producer is engaged and shall include all items of cost exclusive of return on capital invested, interest on borrowed capital, depreciation, depletion, administration, selling costs, and reserves.

(e) In any district where the open-price policy is adopted each producer selling within the district shall file with the district committee not less than five (5) days in advance of the effective date thereof, all prices, terms, and conditions of sale, which shall be f.o.b. plant, or delivered, or both, as may be directed by the district committee. Such prices, terms, and conditions of sale shall continue in effect until other prices, terms, and conditions of sale have been duly filed as

herein provided. The district committee shall immediately cause copies of all such prices, terms, and conditions of sale filed with it to be distributed among the producers selling within the district, and to be made available for public information.

No provision contained herein shall be construed as preventing any producer selling within a district from meeting, as of their effective date, the prices, terms, and conditions of sale, filed as herein provided by any other producer.

Except as provided in the foregoing no producer selling within a district shall deviate from the prices, terms, and conditions of sale filed by him as herein provided.

SEC. 3. Uniform Terms of Sale.—In each region, district, or division, the regional, district, or division committee, as the case may be, may establish, subject to the approval of the Administrator, terms of sale uniform within each region, district, or division. Such terms shall be binding upon all producers selling in that region, district, or division.

SEC. 4. Uniform Credit Practices.—In each region, district, or division, the regional, district or division committee, as the case may be, may establish, subject to the approval of the Administrator, credit practices uniform within such region, district, or division. Such practices shall be binding upon all producers selling in that region, district, or division.

SEC. 5. Plant Capacity and New Production.—(a) To promote the fullest possible utilization of the present productive capacity of the industries governed by this Code, to curb uneconomic overproduction in the various regions herein established, and otherwise to effectuate the purposes of the Act there shall be elected in each state, as hereinafter provided, a standing committee which shall survey its State to ascertain the available sources of supply of the products of these industries within the State, the capacity of existing production facilities and the relation between existing capacity and the actual and potential demand in such state. This committee shall be known as the state committee and shall consist of three (3) stationary-plant producers and three (3) portable-plant producers, together with one (1) additional member who shall be elected by these six and may be chosen from outside the industries. The six representative members of the committee shall be registered producers as defined in Article II of this Code and shall be elected at the time of the election of the regional committee of the region in which the state is located. Members of a state committee shall serve for one year from the effective date or until their successors are elected for a like term. The representatives of the stationary-plant producers shall be elected by a majority of the registered stationary-plant producers voting and the representatives of the portable-plant producers shall be elected by a majority of the registered portable-plant producers voting. The survey and findings reported by each of these committees shall be filed with the appropriate regional committee, which shall transmit a copy thereof to the Code Authority and to the Administrator.

(b) If in the judgment of such a state committee, its survey and findings warrant such action, it may after due notice and hearing determine and define the areas, if any, within its state in which an ample supply of the products of the industries governed by this Code is economically available from existing production facilities. The minutes of such hearing, together with the findings of the state committee and a map showing accurately the boundaries of such areas, shall be filed by each state committee

Rock Products

with the appropriate regional committee, which shall transmit a copy thereof to the Code Authority and the Administrator and, moreover, a copy of the map, together with a summary of the committee's findings, shall be mailed to each registered producer within the region and to all governmental authorities who may properly be interested therein. The Administrator shall review said data and examine said map, and if he shall find that in the area or areas shown on such map an ample supply of the products of the industries governed by this Code is in fact economically available from existing production facilities, such area or areas shall be established as "permissive areas" and subject to the provisions contained in the remaining paragraphs of this section.

(c) If any state committee so recommend, the regional committee shall require, subject to review and disapproval by the Administrator, that before a new plant is installed or the producing capacity of an existing plant increased within any permissive area, notice of such intent shall be filed with the regional committee of the region in which such action is contemplated. Upon receipt of such notice the regional committee shall refer it to the state committee or committees in which such permissive area may be located, who shall collect promptly and with diligence full information concerning existing production capacity in that area. If, in the judgment of the state committee, these data disclose that such new capacity will not tend to defeat the purpose of the Act as herein set forth, the regional committee within fifteen (15) days after the receipt of such notice shall grant permission for the proposed increase in capacity. If, however, in the judgment of the state committee, these data disclose that within the said area an ample supply of the products of the industries governed by this Code is economically available and that such proposed increase in capacity does tend to defeat the purposes of the Act by further increasing overproduction or otherwise, it shall be the duty of the regional committee within fifteen (15) days after the receipt of such notice to recommend to the Code Authority that permission to increase the production capacity in that area be denied. The decision of the Code Authority shall be final except as it may be modified or revised by the Administrator.

(d) The Administrator upon notice to the Code Authority or the regional committee directly involved may at any time suspend the provisions of paragraph (c) of this Section.

(e) Neither the provisions of this Section nor any recommendation adopted by the Administrator pursuant thereto shall be construed as preventing any producer from improving the efficiency of his plant through the installation of new equipment or adopting any methods designed to lower production costs.

(f) The provisions of this Section shall remain in effect for a period of one (1) year after the effective date and thereafter until production in the industries governed by this Code shall reach seventy (70) percent of the available production capacity.

Article VIII—Modification

SECTION 1. *Statutory Provisions.*—This Code and all the provisions thereof are expressly made subject to the right of the President, in accordance with the provisions of subsection (b) of Section 10 of the Act, from time to time to cancel or modify any order, approval, license, rule, or regulation issued under Title I of the Act and specific-

cally, but without limitations, to the right of the President to cancel or modify his approval of this Code or any conditions imposed by him upon his approval thereof.

SEC. 2. *Amendments.*—This Code, except as to provisions required by the Act, may be modified on the basis of experience or changes in circumstances, such modification to be based upon application to the Administrator and such notice and hearing as he shall specify, and to become effective on approval of the President.

Article IX—Monopolies

No provision of this Code shall be so applied as to permit monopolies or monopolistic

practices, or to eliminate, oppress, or discriminate against small enterprises.

Article X—Price Increases

Whereas the policy of the Act to increase real purchasing power will be made impossible of consummation if prices of goods and services increase as rapidly as wages, it is recognized that price increases should be delayed and that, when made, the same should, so far as reasonably possible, be limited to actual increases in the seller's costs.

Article XI—Effective Date

This code shall become effective on the beginning of the tenth day after its approval by the President.

Soft Lime Rock, Feldspar and Slate Industries Submit Codes

THE soft lime rock, feldspar and slate industries will probably be operating under new codes of fair competition of the National Recovery Administration within the next 30 days, if the plans of Deputy Administrator Ralph Fogg and leaders in the respective industries are put into effect.

The hearing on the last of the three industries mentioned, that of slate, was concluded November 8, with the insistence of the deputy administrator, as upon the occasions of the two previous hearings, that all briefs must be submitted at once.

The outstanding feature of the three codes is the increase of wages, which will be practically 80%, when mines and quarries are operating at approximately 70% capacity. There was little controversy as to wages among officials of the organizations presenting the codes, but representatives of organized labor made the usual demands for a 30-hour week, and opposed the wage differential of an average of 5 cents an hour between the North and South. Statements made by leaders indicated a general increase of business since May 1, 1933, with employment increasing.

The schedule of minimum hours for a work-week are practically the same in each of the three codes, 40 hours being the basic period.

In the soft lime rock industry's code time lost because of weather conditions or breakdowns in any one week could be made up, as far as possible, during the succeeding week or weeks of any calendar month.

Minimum wage provision in the soft lime rock industry code are an hourly rate of 25 cents, with a minimum of \$14 per week for office employees, it being stated by Abram F. Myers, Washington attorney who presented the code, that these rates compare favorably with those of other industries in the Florida-southeastern Georgia area, and represent in fact an increase of about 150% over the prevailing wage rate.

The most decided increase in wages in the three codes is that for the feldspar industry.

It was stated by W. H. Hipps, Asheville, N. C., engaged in the mining of feldspar and its sale to mills, that the North Carolina Feldspar Association had made a recent survey, and it was found that this state produced at least 57% of the product consumed in the United States. Wages in the three counties of western North Carolina, where feldspar is mined, are now 10 cents an hour for common labor, and 25 cents for the most skilled workmen. The code for the feldspar industry sets a minimum hour wage for employees in mining operations at 25 cents in the South and 30 cents in the North, those for tool dressers and drillers at 30 cents in the South and 35 cents in the North, and those for milling and grinding workers at 30 cents in the South and 35 cents in the North. All clerical and office employees in both mining and milling divisions are to receive not less than \$12 per week.

The only deviation in the code for the slate industry as to work hours is that the same maximum of 40 hours is established but no employee may work more than 48 hours in any one week during each six months' period beginning August 1 and February 1. The exceptions to the maximum number of working hours include emergency employment occasioned by breakdowns and other factors beyond control, managerial, and other employees engaged in work where such maximum hours of employment create an impractical condition, as in case of the traveling sales force, watchmen (but not over 12 hours in any one day), and other classes designated by the slate industry code committee with the approval of the administrator.

No employee in the slate industry shall be paid at less than the rate of \$12 per week or 30 cents an hour, it being intended by this provision that no employee shall be paid less than this sum whether compensated on time, piecework or other basis. It is specifically provided as to slate industry employees that nothing in the code shall supersede any laws of a state in which the industry is operating.

Rock Products

November 25, 1933

Soft Lime Rock

Deputy Administrator Ralph Fogg presided at the hearings on the code for the soft lime rock industry, which document was presented as that of the Southeastern Soft Lime Rock Association, described as a rather small regional industry, confined exclusively to Georgia and Florida. The code was drafted at a meeting held at Jacksonville, Fla., July 15, and ratified at a subsequent meeting at Tallahassee, Fla.

Present at the hearing were L. B. McCloud, Willeston, Fla., president of the association, William Palmer, Ocala, Fla., members of the committee named to draft the code; G. F. Ware, Leesburg, Fla., Willis Calloway, Atlanta, Ga., and Norman Horne, Ocala, Fla., who served as federal advisor for the industry during the hearing.

The uses of soft lime rock, pointed out by Mr. McCloud, include rock crushed to a diameter of 3½ in. for a base in highway pavement of various kinds, and as the basic material for at least 7,000 miles of the highway system of Florida, and the greater part of that in southeastern Georgia.

Waldo C. Holden, representing the American Federation of Labor, offered a substitute for the child labor provision of the code to exclude all persons under 18 years, whereas the code provides employment of those 16 when not engaged in hazardous work. Mr. Holden contended that all employment in the soft lime rock industry was hazardous. He also requested a 7-hour day with a 30 to 35-hour week.

D. W. Tracy, president of the International Brotherhood of Electrical Workers, requested that a maximum work week of 40 hours be included in the code for electrical workers with minimum rates of pay fixed at not less than the established rate with time and a half for overtime.

James V. Mareschi, international president, and John W. Garvey, general representative of the International Hod Carriers, Building and Common Laborers' Association of America, Quincy, Mass., also filed a brief asking a maximum hour-week of 30 hours, 5 days a week and 6 hours a day, and also objected to the 25 cents an hour minimum wage.

A conference was held after the code hearing with indications that this code will be approved soon by the President.

Feldspar

In presenting the code for the feldspar industry before Deputy Administrator Fogg, W. N. Guthrie, of the engineering firm of Stevenson, Jordan & Harrison, New York City, said that it was the outgrowth of a meeting held in New York City, July 20, of the leaders of the Feldspar Grinders' Association. Of the 14 known companies in the grinding business, the association as then constituted included eight and represented 57% of the industry in number of companies and approximately 80% of the industry's volume.

It was then decided that one basic code for the entire industry would be drafted, to include the feldspar mining industry, which was done with the result that the code presented represented the viewpoint of 80 to 85% by volume of both the mining and grinding interests.

The code committee that drafted the code comprised H. P. Margerum, president of the Consolidated Feldspar Corp., of Trenton, N. J.; W. H. Hipps, Asheville, N. C.; and Mr. Guthrie.

Mr. Hipps advocated the code as drawn, especially Section C, of Article VI, which reads:

"No member of the industry engaged in grinding operations shall purchase products of the industry engaged in mining operations at less than such minimum prices as the Code Authority (composed of three members from the two branches, no member selected by the mining group to be engaged in grinding, and vice versa) may from time to time establish. The Code Authority, prior to establishing such minimum prices, shall submit its recommendations with respect thereto to the Administrator for his approval."

Messrs. Hipps and V. V. Kelsey, vice-president of the Consolidated Feldspar Corp., urged the foregoing provision as a permanent clause:

C. H. Peddrick, Jr., of the United Feldspar Corp., New York City, took the position that feldspar should be graded according to chemical analysis, saying that mills had chemists and facilities to thus grade feldspar. He offered an amendment that Commercial Standards 23-30 be followed in all grading, whereas Mr. Hipps submitted an amendment that rough classification of feldspar be in two grades, A and B, for minimum price purposes.

It was stated at the hearing that the proposed code would increase wages in the industry 80%, and that over 350 men would be put to work one way or another by adoption of the code, in addition to those now employed.

As to the present status of the industry, it was brought out that the output in 1929 was 208,000 tons, but in 1932 dropped to 95,000 tons, the price of \$15.29 per ton in 1929, declining to \$11.69 in 1932, with the total production capacity of the industry being 715,000 tons per annum.

It was developed, however, that the uses of feldspar are being widened, it being pointed out that feldspar is most commonly and principally used as a chemical agent in glass batches in various manufacturing of all kinds of glassware and as a fusing agent for glasses in the manufacture of enamel and pottery products, and that now it is being extensively used in soaps, abrasives and refractories.

Slate

At the hearing of the code for the slate industry, Virginia producers raised a ques-

tion as to labor, especially as the wage differential, saying that it was not wholly justified, while one producing region asked that the minimum wage be fixed below that stipulated in the code. The point was also raised at the hearing on the slate producers' code that representation on the Code Authority to administer the code was not sufficiently distributed and that it might work a consequent hardship and preclude some producers from participation and place their operations under control of branches of the industry producing different types of slate and serving markets entirely different.

In presenting the code for the industry, W. S. Hayes, executive-secretary of the National Slate Association, Philadelphia, Penn., said that increased activity on the part of home owners in making repairs on long-neglected properties, and the federal public works program, held out hope for rehabilitation of the industry.

Suggestions Offered By Operators

The statement that the minimum wage should be below that proposed in the code was presented by T. L. Nelson, Rising & Nelson Slate Co., West Paulet, Vt., who asked that 25 cents an hour be substituted in the code in place of 30 cents, and also asked that employers be permitted to keep aged and incapacitated employees on the payrolls at rates lower than that provided in the code.

Mr. Nelson also said that the high cost of transportation was still a handicap for the industry and that many quarries are now operating solely to give employment.

James T. Sloan, Arvonia-Buckingham Slate Co., Richmond, Va., offered an amendment that the wage schedule for the South be placed at a minimum of 22½ cents an hour, or \$9 a week, which he said would be a nearer approach to the average wage now paid.

Mr. Sloan continued that living costs are lower in the South than in the North; that colored labor is used almost exclusively in some Southern sections, and that its output, per employe, is much less than that of white labor of the North.

Organized labor, through Waldo C. Holden, American Federation of Labor, asked for the 30-hour week plan, a minimum wage of 50 cents an hour, and a guarantee of \$17.50 per week.

Mr. Sloan and A. L. Carpenter, Fair Haven, Vt., both opposed the proposed code authority as embodied in the code, saying that the selection of members by geographical regions rather than by the type of slate product made and the markets served would have the effect of excluding several branches of the industry from proper representation.

At the conclusion of the hearing, a conference was held to reconcile differences. Deputy Administrator Fogg said that supporting briefs of amendments must be submitted within 24 hours.

Industrial Sand Producers Vote to Become Division of National Sand and Gravel Association

FIFTY-FOUR executives of industrial sand producing companies, each representing in some instances several other companies in their respective producing localities, met in Pittsburgh, Penn., November 9, at the call of A. Warsaw, chairman of the temporary organization committee, who is president of the Wedron Silica Co., Chicago, Ill. It was undoubtedly the largest and most representative gathering of industrial sand producers in history. The chief point at issue was how the industrial sand industry would organize to function under the NRA.

Mr. Warsaw presided as chairman. The largest part of the time was devoted to a very frank discussion of the NRA, its philosophy and its works and its personnel, insofar as this industry was concerned. The NRA was represented by R. E. Plumpton, assistant to Deputy Administrator Malcolm Pirnie, who is handling the Code of the Crushed Stone, Sand, Gravel and Slag Industries, and Col. Willard T. Chevalier, industrial advisor to the NRA on the Crushed Stone, Sand, Gravel and Slag Industries Code, the Ready-Mixed Concrete Industry Code, and some others.

Col. Chevalier did most of the talking, by repeated requests, and gave an exceedingly interesting and instructive picture of the NIRA and the NRA. What the producers seemed to be interested in chiefly was the philosophy behind the recovery measures. Col. Chevalier seemed quite positive that business and industry are undergoing a radical and revolutionary realignment and that industrial self government under Federal supervision has come to stay, regardless of the fate of the NIRA or the NRA. He explained "off the record" the reasons for many changes of policy in the progress of the NRA from one code to another, and predicted that many changes would have to be made in codes already signed by the president.

Col. Chevalier made it quite plain that industry and business would have to be circumspect and public-welfare-minded in the working out of their problems under their codes. How much regulation by government bureaucracy comes to pass depends much on how tactfully and intelligently business and industrial leadership meets its problems.

Mr. Plumpton answered specific questions in regard to the code of the crushed stone, sand, gravel and slag industries, as did also V. P. Ahearn, executive secretary of the National Sand and Gravel Association. At that time the code had not been approved by the National Recovery Administrator, and it was not read in its entirety, but those parts

were read which provide for *divisional grouping* of the industries where desirable.

Report of the Organization Committee

After a thorough discussion and with not a single dissenting vote, a report of the organization committee was adopted, which provides for the organization of the Industrial Sand Industry as a divisional group under the Code Authority of the Crushed Stone, Sand, Gravel and Slag Industries, and as a part of the National Sand and Gravel Association. Some of the more important parts of the report follow:

Pursuant to the resolution adopted at the general meeting of Industrial Sand Producers in Pittsburgh on July 7, 1933, your Committee on Organization has carried out the necessary investigations for the purpose of determining the most suitable means of bringing the Industrial Sand Industry within the requirements of the National Industrial Recovery Act.

In the course of this investigation, we have considered the relative desirability of operating as an independent organization carrying on our own activities but affiliated in some manner with the National Sand and Gravel Association, or the possibility of making arrangements to operate as an independent organization within the National Sand and Gravel Association.

The Committee on Organization has held five different meetings in the consideration of the problems entrusted to its handling, and it was represented at all open meetings of the Code Committee of the Sand and Gravel, Crushed Stone, and Slag Industries. It also attended the public hearing on the Code of Fair Competition for these industries conducted by the National Recovery Administration in Washington on August 28 and 29.

In addition to these formal activities of the committee, we have also maintained a constant contact not only with the national associations sponsoring the code of the sand and gravel and related industries, but we have also been in intimate touch with those officials of the National Recovery Administration under whose immediate jurisdiction would fall the Industrial Sand Industry. By means of this procedure, your committee has been kept fully informed as to all developments of interest to the Industrial Sand Industry, and we believe that we are prepared, at this time, to lay before the meeting a program of action which will not only satisfy the requirements imposed on our industry by the Recovery Act, but will also place at our disposal an effective means of stabilizing our business.

* * * *

Before submitting our recommendations as to principles which should guide the Industrial Sand Industry in fulfilling the requirements of the Recovery Act, your Committee felt that it should return to the industry as a whole, for the purpose of submitting a report concerning the work entrusted to its care. For manifest reasons, it is impossible at this time

to lay before the meeting a complete code for your consideration; but, if our recommendations as to procedure are approved, we believe that the industry will recognize the necessity for extending the life of the Organization Committee until such time as it has accomplished the objective of the Industrial Sand Industry. On the basis that this suggestion will be acceptable to the industry, we offer the recommendation that the Committee on Organization be vested with authority to enlarge its membership, in order to provide for more adequate representation, not only of the various classes of industrial sand, but also in a geographical sense.

As a result of a continuous study, extending over four months of the problems of the Industrial Sand Industry with respect to organization in conformity with the Recovery Act, and based upon the contacts which it has established with official sources and with the National Associations sponsoring the Code of Fair Competition for the Sand and Gravel, Crushed Stone and Slag Industries, your Committee on Organization submits the following recommendations for the consideration of the meeting:

1. That the term "Industrial Sand Producer" be defined to mean any member of the industries engaged in the recovering and/or processing of sand for purposes other than construction and/or building.

2. That the Industrial Sand Industry comply with the provisions of the National Recovery Act by adopting the Code of Fair Competition of the Sand and Gravel, Crushed Stone, and Slag Industries, by operating as a division under this code as provided in said code.

3. That in order to carry out the provisions of recommendation Number 2, a Permanent Organization Committee be established, charged with the responsibility of preparing, and securing the approval of the National Recovery Administration to such supplemental articles and stipulated revisions to the above code as may be found necessary to adapt this code to the needs of the Industrial Sand Industry.

4. That this Permanent Organization Committee also be entrusted with the responsibility of effecting a definite organization of the Industrial Sand Industry, as a Division of the National Sand and Gravel Association, with the understanding that the Industrial Sand Industry will have self-government through such division in the organization of its group and in the administration of its affairs.

5. That the following be established as the major classifications of industrial sand:

- A. Glass and other melting sands.
- B. Foundry sand—unbonded.
- C. Foundry sand—bonded.
- D. Ground sand.
- E. Blast sand.
- F. Traction, grinding and miscellaneous sands.

6. That in order to conform with the code that these major divisions of industrial sand be further divided into geographical producing regions, in order that opportunity may be thus afforded for the maximum amount of local self government in the administration of the provisions of the Code.

Rock Products

November 25, 1933

7. That a budget of anticipated expenditures in the interim prior to the first meeting of the Code Authority be established, and that the costs be equitably apportioned among industrial sand producers.

8. That in view of the unquestioned value of the data already collected and compiled under the auspices of the Temporary Organization Committee that the Permanent Organization Committee be instructed to expand the statistical activities of the Temporary Organization Committee in order that the Industrial Sand Industry may have at its disposal a more adequate understanding of the economic significance of the industry.

Tentative Geographical Regions

In recognition of the magnitude of the task of dividing the country by geographical producing regions, in order fully to reflect the needs of the various divisions of the Industrial Sand Industry, the following is suggested as a basis for discussion of the problem. It is important that the Organization Committee receive the benefit of the suggestions of all producers in attendance at this meeting. Please let us emphasize that the Organization Committee requires the active co-operation of all producers at the meeting in reaching a solution of this problem.

GLASS AND MELTING SAND

1. New Jersey, New England, Delaware and New York.
2. Pennsylvania, Virginia, West Virginia and Maryland.
3. Ohio, Michigan, Kentucky.
4. Illinois, Missouri, Wisconsin and Indiana.
5. Oklahoma and Arkansas.
6. California and Nevada.

GROUND SAND

1. New Jersey and Delaware.
2. Pennsylvania, Virginia, West Virginia and Ohio.
3. Illinois, Missouri and Wisconsin.

BLAST SAND

1. New England, Eastern New York (east of line Rochester to Elmira), New Jersey, Delaware, Maryland, Virginia, West Virginia, eastern Pennsylvania (east of Altoona).
2. Ohio, Kentucky, Michigan, Indiana, Illinois, Wisconsin, Minnesota and Iowa.

FOUNDRY SAND—UNBONDED

1. New England, eastern New York, New Jersey, eastern Pennsylvania, Delaware, District of Columbia, eastern Maryland.
2. Western Pennsylvania, western New York, Michigan, western Maryland, Virginia, West Virginia, Ohio, and northern Indiana (north of Fort Wayne).
3. Indiana (south of Fort Wayne), Illinois, Wisconsin, Missouri, Iowa and Minnesota.
4. Oklahoma and Arkansas.
5. California.

FOUNDRY SAND—BONDED

1. New England, eastern New York, New Jersey, eastern Pennsylvania, Delaware, eastern Maryland.
2. Western New York, western Pennsylvania, western Maryland, Virginia, West Virginia and Ohio.
3. Indiana, Illinois, Michigan, Wisconsin, Missouri, Iowa and Minnesota.
4. Oklahoma and Arkansas.
5. California.

TRACTION, GRINDING AND MISCELLANEOUS SAND

1. New England, eastern New York, eastern Pennsylvania, New Jersey, Delaware,

District of Columbia, eastern Maryland.

2. Western Pennsylvania, western New York, Virginia, West Virginia, western Maryland, Ohio and Kentucky.

3. Indiana, Illinois, Michigan, Missouri, Wisconsin, Iowa, Minnesota.

4. Oklahoma and Arkansas.

5. California.

Economic Status of the Industry

S. M. Hudson, of the firm of Stevenson, Jordan & Harrison, management engineers, gave excerpts from the report his firm had made at the request of a group of leading companies in the field. His talk consisted chiefly of statistics, among the most interesting of which were the following: The payrolls of the industrial sand industry shrank in 1933 to less than 25% of the payrolls in 1930 (a loss of more than 76%); average wage rates decreased from about 48c per hr. to 40c per hr. (17%); earnings of the average individual laborer decreased from \$1.261 per year in 1929 to \$752 in 1932 (40%); average return on capital invested decreased from 7.4% in 1929 to a loss of 1.6% in 1932. Mr. Hudson seemed to think, that despite of the industry's previous lack of organization; it had held its own as well as industry as a whole.

Registration

- Ahearn, V. P.; National Sand and Gravel Assn., Washington, D. C.
 Allen, Geo. P.; Tavern Rock Sand Co., Toledo, Ohio.
 Beyer, E. J.; Michigan Silica Co., Rockwood, Mich.
 Bixler, Ira E.; Enterprise Sand Co., Pittsburgh, Penn.
 Bivins, Wilbert; Millville, N. J.
 Boynton, E. W.; Northern Gravel Co., Muscatine, Iowa.
 Brown, W. A.; Kerchner, Marshall Co., Pittsburgh, Penn.
 Cable, J. S.; Columbia Silica Co., Akron, Ohio.
 Campbell, E. J.; Sun Sand Co., Thayer, W. Va. (Main Office—Charleston, W. Va.)
 Chevalier, Willard T.; *Engineering News-Record*, New York.
 Clarke, R. W.; White Rock Silica Co., Greenville, Penn.
 Clay, O. D.; The Tuscaraw Sand & Coal Co., Canton, Ohio.
 Cleary, Jack; Sand Products Corp., Cleveland, Ohio.
 Coxey, J. S., Jr.; Industrial Silica Corp., Youngstown, Ohio.
 Crew, J. A.; The Ayres Mineral Co., The Central Silica Co., The Millwood Sand Co., Zanesville, Ohio.
 Eachus, C. S.; Dunbar Corp., Dunbar, Penn.
 Farmer, A. M.; Sand Products Corp., Cleveland, Ohio.
 Gorman, P.; Industrial Silica Corp., Youngstown, Ohio.
 Ghleniccochen, Al.; Michigan City, Ind.
 Goodnow, A. C.; Standard Silica Co., Chicago, Ill.
 Graefner, C. E.; Northern Gravel Co., Muscatine, Iowa.
 Haddow, Hugh, Jr.; Menantico Sand & Gravel Co., Millville, N. J.
 Hay, R. G.; Ayers Mineral Co., Zanesville, Ohio.
 Hines, R. M.; Lake Welton, Wisc., White Rock Silica Co., Browntown, Wisc., and Chicago, Ill.
 Hohams, G. W.; Virginia Gravel & Sand Co., W. Va.
 Hoffman, H. M.; Silica Products Co., Harrison, Ark.
 Hudson, S. M.; Stevenson Jordan & Harrison, Management Engineers, New York City.
 Kenefich, Matt, J.; Michigan City, Ind.
 Kerchner, L. S.; Dunbar Corporation, Dunbar, Penn.
 Lamke, A. C.; Industrial Silica Corp., Youngstown, Ohio.
 Locher, B. G.; N. O. Speer Sand Corp., Glasgow, Va.
 Manor, J. M.; Consolidated Feldspar Corp., East Liverpool, Ohio.
 Matthews, Corwin; Jackson Sand Mining Co., Jackson, Ohio.

Matthews, T. C.; Pennsylvania Glass Sand Corp., Lewistown, Penn.

McDougall, P. S.; Ottawa Silica Co., Ottawa, Ill.

McKee, Mark T.; Sand Products Corp., Detroit, Mich.

Metsch, C. G.; Potters Mining and Milling Co., East Liverpool, Ohio.

Meyer, C. R.; Pioneer Silica Products Co., St. Louis, Mo.

Miller, Alfred J.; Whitehead Brothers Co., New York City.

Moore, F. L.; The Peerless Sand Co., Conneaut, Ohio.

Pettinos, George F.; G. F. Pettinos, Inc., Philadelphia, Pa.

Plumpton, R. E.; NRA, Washington, D. C.

Putnam, John F.; The National Silica Co., Oregon, Ill.

Rockwood, Nathan C.; ROCK PRODUCTS, Chicago, Ill.

Schneider, E. O.; Ottawa Silica Co., Ottawa, Ill.

Sherwood, Abbot W.; Tavern Rock Sand Co., Toledo, Ohio.

Snyder, Pierce A.; Columbia Silica Co., Akron, Ohio.

Strouss, J. M.; Deckers Creek Sand Co., Morgantown, W. Va.

Swartzlander, T. H.; Pittsburgh Plate Glass Co., Pittsburgh, Penn.

Taggart, M. R.; Taggart Co., Philadelphia, Penn.

Thornton, C. A.; Ottawa Silica Co., Ottawa, Ill.

Tomlin, Burdette; New Jersey Silica Sand Co., Millville, N. J.

Vollmer, J. S.; Pittsburgh Silica Sand Co., Pittsburgh, Penn.

Walker, W. S.; America Silica Sand Co., Ottawa, Ill.

Warsaw, A.; Wedron Silica Co., Chicago, Ill.

Wehenn, Allen C.; Chicago, Ill.

Whitehead, J. H.; Whitehead Bros. Co., New York.

Williams, Col. Ashby; Washington, D. C.

Woods, Wm. J.; Pennsylvania Glass Sand Corp., Lewistown, Penn.

Short Term Rates

THE ALABAMA public service commission recently approved sand and gravel rates to points on the Selma highway where extensive road work has been underway for some time.

From Prattville Junction over the Louisville and Nashville Railroad to Benton the rate was set at 48c per ton and to Chickadee it was prescribed at 40c. The Western Railway of Alabama was given authority to establish a 33c rate on sand and gravel shipped from Montgomery and Selma to Lowndesboro. All of these rates expire December 31.

Railroads Divided on Sand-Gravel Rate Proposal

GEORGE H. SHAFFER, transportation rate expert of the Illinois Commerce Commission, has begun the gathering of evidence which will be the basis of decision on the sand and gravel rate changes proposed by the Illinois Terminal System, the Rock Island and the Chicago and Illinois Midland railroads. The Illinois Central and the Alton line are opposed to the new rate.

Present rates on sand and gravel from Chillicothe to Springfield, Ill., are \$1.10 a ton. The petitioning railroads claim that competition is keen and ask that the rates be reduced 20c.

T. E. McGrath of the McGrath Sand and Gravel Co., Lincoln, Ill., was among the first witnesses called. He testified that his company is anxious for the introduction of the 90c rate so that it can better meet present competition.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

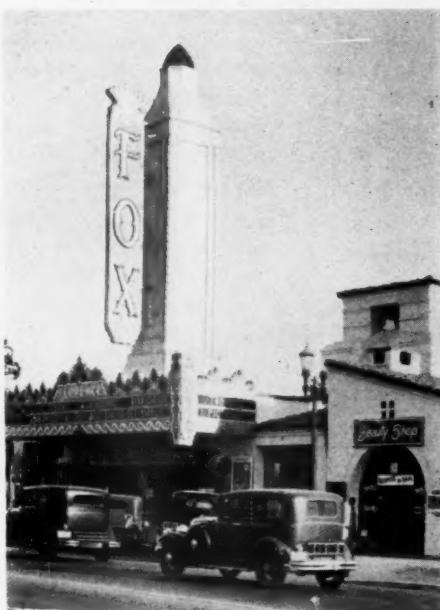
Concrete Masonry in the Earthquake Zone

MOST buildings constructed of concrete masonry were affected "either not at all or in but slight degree by the earth movement," according to E. W. Bannister, consulting architect who has completed a thorough survey of structures in the zone rocked by the recent severe earthquake centered at Long Beach, Calif.

His report reviews post-quake conditions in Compton and South Los Angeles, as well as those in Long Beach. The type of concrete masonry in general use in southern California is concrete tile approximately 12 x 8 x 4-in.; small tile of 4-in. width are used for veneer, partitions and specials. Average breaking strength, says Mr. Bannister, is well above general requirements of the federal government and underwriters (700 lb. per sq. in. of gross area). Coast practice in most products plants results in units of high density; absorption rating is said to average 8% as compared with the usual required maximum of 10%.

Effect on School

The report suggests that the Compton area was hardest hit by the quake. The Dominguez school building, a two-story structure of concrete masonry with tile roof, is located in this section. Objectively, Architect Bannister relates: "This structure has no belt courses or other wall reinforcement, other than interior partition walls of same mate-



Partial view of a combination theatre and patio store arcade in South Los Angeles. Stores and open arcade, as well as the two-story movie entrance are of concrete masonry. This building group, subjected to severe seismic action, sustained only minor damage

rial. A brick incinerator and chimney on one side was torn away from adjacent concrete masonry to a distance of about four

inches. The chimney was cracked in several places, necessitating quick removal.

"No damage of any sort was visible on exterior of structure and a few minor plaster cracks was the total interior damage. The shock at this point was sufficiently strong to overturn a 400-lb. gas heater and completely wreck the pump house of the Dominguez Water Co."

Concrete Pipe Hearing

THE National Recovery Administration has announced a public hearing on November 28 for the code of the concrete pipe manufacturing industry. This code was filed by the American Concrete Pipe Institute claiming to represent 86 per cent of the industry. Deputy Administrator Malcolm Pirnie will conduct the hearing.

The proposed code fixes a basic maximum work week of 48 hours averaged over a period of six months, not more than 48 hours in any one week or more than 8 hours in any one day. This provision does not apply to employees engaged in executive work, crane operators, machine operators, watchmen and those on emergency work or maintenance or emergency repair work. The maximum work week for clerical employees is 40 hours excluding employees in executive capacity, outside salesmen and those in establishments employing not more than two persons in towns of less than 2,500.



Built of concrete masonry without bond beam or other reinforcement, this small store building (left) felt tremors come and go without being damaged in any way. At right is a bakery located in the center of the Compton area most violently affected; it was unhurt except for loss of the brick front. Side walls are of concrete masonry without bond beam, but with a double row of tie rods at roof level



Digest of Foreign Literature

By F. O. Anderegg, Ph. D.

Consulting Specialist, Pittsburgh, Pa.

The Structure of Concrete Mixtures. The contributions of Fuller, Abrams, Talbot and Richart, Furnas, Anderegg and Weymouth, also Edmund Shaw (Cf. *ROCK PRODUCTS*, 1933 No. 8, p. 38) are carefully analyzed in the light of his experience in a very able manner by M. C. Macnaughton. In his opinion only two factors, apart from the amounts and inherent peculiarities of the specific materials, are of any serious importance in fixing the strength of concrete mixtures. These are:

"1. The fact that excessive amounts of any one particle size in the mix will produce particle interferences with consequent loss of strength.

"2. The fact that for combinations of specific aggregate materials with an individual cement, the resultant mixtures being free from particle interference, and within the range of normal consistencies the strength of the mix is a function of the volume relation of water to cement."

Start was made with an ideally graded aggregate which took into account the amount of coarser cement present with as lean a mix as 3.3 bags of high early strength cement per cubic yard. At a slump of about 6 in. this concrete gave 1,050 lb. at 7 days. As cement was added, owing to interference between the aggregate due to the cement particles, some of the fine aggregate was removed progressively, while the greater amount of paste, by reducing bridging tendency, permitted the ratio between successively larger particle groups to be raised. As the amount of cement per cubic yard was increased from 300 to 900 lb., the fine aggregate was reduced 1,600 to 900 lb., the coarse aggregate was raised from 1,740 to 1,900 lb., resulting in a 28-day compressive strength rise, apparently logarithmic, from 1,050 to 4,575 lb. With high early strength cement a parallel curve was observed going from 1,500 lb. to 5,300 lb. In the meantime, the water requirement for a 5 to 6-in. slump decreased from 36.5 gal. at 300 lb. of cement to 33 at about 600, but later rose, indicating that a mix containing about 6 bags of cement, 1,350 of sand and 1,850 of crushed stone, should yield the best results.

The quality of the cement is evidently important in obtaining results and the prime essential in obtaining uniform quality concrete is control of the quality and the amounts of materials. Where aggregates delivered to the job vary from hour to hour, it is almost impossible to get anywhere with concrete design or control. *The Engineering Journal*, Canada, August, 1933.

Accurate Design of Concrete. The subcommittee of the Austrian Engineers and

Architects' Union has made an extensive study of the grading of aggregate for the production of quality concrete. Their recommendations are for gap-grading, with practically no sand passing a 100-mesh sieve, but all passing about an 8-mesh sieve. The coarse aggregate should then be within a rather narrow range of sizes. They have used Power's remolding apparatus for consistency measurement to good advantage. Their results confirm Abram's water-cement ratio law and, within certain limits, his fineness modulus principle. *Mitt Versuche. Oesterr. Eisenbeton-Ausschuss* 1933, 14.

Validity Limits of Abrams' Fineness Modulus. A systematic study has been made of a series of gradings for a given fineness modulus and upper size limit by L. Prokopecz of Budapest. He found that the principle holds for the majority of the gradings used. Marked deviations were obtained when insufficient fines were present to give proper workability. Other deviations developed when humps in the middle part of the grading curve occurred. (Here "interference" is obvious.) On mixing a given weight of water, cement and aggregate, having a constant fineness modulus, a variety of consistencies, all within the range of commercial applications, were observed. If the consistency was maintained constant the water-cement ratio varied, indicating the approximate nature of this principle. *Zement* (1933) 23 No. 33 p. 441.

The Action of Corrosive Solutions on Cements. Dr. Karl Dorsch continues with his studies on the hardening and corrosion of cement by making up neat 3-cm. cubes of ordinary and high strength portland, iron cement, blast-furnace cement and aluminous cement. After preliminary curing, specimens were stored in distilled water and in 15% solutions of ammonium, sodium and magnesium sulfate, in 15% magnesium chloride and in saturated calcium sulfate with the temperature maintained constant, but with no renewal for 18 months. In this series the high strength portland specimens were attacked most quickly, followed by the iron-ore and ordinary portland, the aluminous and the blast-furnace cements.

The attack seemed to depend upon the amount of lime set free in the specimens. Because of the volatility of the ammonia, ammonium sulfate was most harmful to all the cements, while distilled water and magnesium chloride had no effect. The calcium sulfate solution produced a slight attack on the high strength portland after 500 days. The solution of sodium sulfate acted most vigorously on those cements containing alum-

ina, due to the solvent action of sodium hydroxide on aluminates. Blast-furnace cement and iron ore cement stood up best in this solution. Magnesium sulfate had no effect on the aluminous cement and only a little on the cement made from slag, while its greatest attack was on the iron-ore cement. Cements of the same chemical analysis often do not show the same resistance to corrosive solutions.

To determine the resistance of these cements to carbon dioxide similar specimens were stored in various solutions which were changed three times a week, including tap-water, distilled water and CO₂-water, which was kept saturated by passing the gas constantly through the water. In distilled water the amount of lime in solution per 100 cc. was 68 mg. during the first week, falling to 2 mg. during the 70th week. In tap-water the amount was nearly constant at about 53 mg. per 100 cc., while in CO₂-water the amount was at first 109 mg., rising to 260 in the 14th week and falling to 148 during the 70th week. The tap-water had no leaching action; in other words, the CO₂ content was just right, not only to produce a protective film of CaCO₃, but also to prevent further solution. The distilled water contained a small amount of CO₂ which gradually built up a protective layer of carbonate. In the carbonated water, the carbonate first formed soon passed into solution as bicarbonate. In the latter, the lime was almost completely removed to a depth of 2 mm. in the 70 weeks and in distilled water to a depth of 1.5 mm. The removal of the lime, of course, destroys the binder. *Cement and Cement Manufacturing* (1933) 6, No. 8, p. 271.

Comment: One factor evidently not considered by Dr. Dorsch is the packing of the neat cement paste. Just as with aggregates, certain gradings yields lower voids than others, so the size distribution of the cement will determine the opportunity for contact with the corrosive solutions. While in his experiments one early strength cement was badly attacked, other instances are known where such a cement has made an outstanding record of resistance; e. g. Bailey Tremper, *Proc. Am. Concrete Inst.* (1932) 28, p. 18.

The Effect of Alkalies on the Viscosity of Raw Cement Slurries. The reduction of viscosity of slurries to be burned to form portland cement is often of considerable practical importance; for instance, with lower viscosities the water required to hold the solids in suspension is reduced. In the study of this phenomenon H. Salmang and H. E.

Schweite have added varying amounts of sodium hydroxide, carbonate or silicate to a variety of suspensions of German raw mixes and noted the time required for a cylinder rotating in the suspension to make a certain number of revolutions. When sodium hydroxide was added the viscosity dropped to a sharp minimum and then rose rapidly. The minimum varied with different materials. Sodium carbonate was much better, probably being most suitable for technical use, although the sodium silicate also gave some nice results. Best results were obtained on adding alkali to the extent of 0.02% Na₂O of the dry weight of the raw mix. Nothing was said, however, concerning any increased efflorescing tendency on the products manufactured from such a cement. *Zement* (1933) 22, No. 20, p. 301.

The Inversion of Portland Cement. Kurt Würzner offers the suggestion that one result of the action of moisture and carbon dioxide of the air on portland cement is to produce some action at the surface so that when brought into contact with water, a great deal more is taken up, with greater heat of adsorption, etc., resulting in a marked acceleration of all the reactions of setting. In proof of this suggestion, the fact that a cement exposed to the atmosphere cannot be packed into the original space is offered. To study this effect, an inverted U-tube was filled with boiled water, one end was placed in mercury and the other connected with 400 grams of cement mixed into a stiff paste in a hard-rubber box. As the reaction proceeded, water was brought into combination and mercury was drawn up into the tube. A height of the mercury column of 5 to 10 cm. corresponded to the initial set as determined with the Vicat needle, while the final set was obtained at 30 to 40 cm. By plotting the rise against time a graphical record was obtained of the progressive action of moisture and of carbon dioxide on the setting behavior of portland cement. *Tonindustrie Zeitung* (1933) 57, No. 61, p. 707.

The Law for Cement Size Distribution. P. Rosin and E. Rammel had made a study of the size distribution of ground coal and had set up an empirical equation involving a negative log-log function of the residue above any size against the log of that size. The law as applied to a series of results obtained with cement with fair success, the sizes having been determined by air elutriation. *Zement* (1933) 23, No. 31, p. 427.

Comment: When the Rosin and Remmler negative log-log function is plotted against the cumulative fraction below any given size a flat S-shaped curve is obtained, which happens to fit many commercial cements, especially when not ground so very fine. A more logical method [Cf. Furnas, *Ind. Eng. Chem.* (1930) 23, p. 1052; or ROCK PRODUCTS, Feb. 13, 1932, p. 35] and one yielding much more valuable information, is to plot the cumulative per cent below any size against the log

of that size, i. e., allow equal distances along the abscissa for the ranges 5 to 10, 10 to 20, 20 to 40, and 40 to 80 microns. That will bring to light any deviations from one of the family of curves having good packing, especially the hump in the region ranging from about 30 to 50 microns, characteristic of so many commercial cements, and which, by virtue of interference, prevents proper packing and raises the water requirement. The log-log curve conceals these deviations. Another lack, that many cements have, is too little material between 10 and 20 microns to develop proper increases in 3-day and 7-day strengths. Again the log-log curve tends to conceal this defect. The reviewer, by applying the Furnas equation, has discovered that the best all-around size distribution for portland cement is logarithmic; experimentally, the nearer the curve for a cement plotted as recommended, approaches a straight-line, the better the results will be.

Microscopic and X-Ray Studies of the Constitution of Cements. Serban Solacolu of Bucharest has made an extensive study not only of commercial cements but also of numerous synthetic cements burned in the laboratory. His results confirm those now being generally accepted: In portland cements having highest strength, the silica and the alumina are chiefly present as tricalcium-compounds. In aluminous cement of the first kind (the commercial variety) mostly monocalcium aluminate with some dicalcium silicate were found with occasional evidence of pentacalcium trialuminate and dicalcium ferrite. The second kind of aluminous cement contained gehlenite and tricalcium pentaluminate. *Zement* (1933) 22, No. 23, p. 311.

The Setting of Aluminous Cement. Experiments made on setting time, temperature, pH and strength by Renato Salmoni and H. E. Schweite show a very close similarity. The temperature starts to rise at the point of final set as determined by the Vicat needle. Even when the cement is shaken with a large excess of water for a period less than the final set, then filtered and the water content brought again to normal consistency, the temperature follows almost the same curve as when made up to that consistency at the start. If the cement is shaken, however, beyond the final set, the loss of some of the reaction products, hydroxyl ions, interferes with the heat evolution.

When the reaction is followed by observing the pH with an antimony electrode, in about an hour of vigorous shaking a constant value is reached of about 11.7. When the final set is reached it rises in about two hours to 12.1 and then slowly. On shaking the aluminous cement with an excess of water the cement began to swell at about the final setting point. Such a connection between swelling and pH suggests a colloidal gel. The addition of other chemicals was found to affect the pH, and the time of heat development according to their effect on the pH, with the sole exception of barium hy-

dioxide, because of the difference between the dissociation constants of barium and calcium aluminate. On shaking 100 grams of cement with 400 of water for 12 hours the cement had swollen to 250 cc., but on adding normal alkali it immediately increased to 350 cc.

The Donnan membrane equilibrium principle seems to cover the reactions, to a certain extent at least, with a mobile calcium ion and the stationary alumination. Between single particles and the mixing water there is an osmotic pressure and when the single particles are separated only by a thin film they are pressed together by a force of the order of this pressure. With an infinitesimal layer of water between, the grains grow into each other, giving some strength as soon as the final set is reached. The reason for the increase in pH at this point is probably due to the completion of the reaction with one of the constituents of the cement.

The strength of the cement rises rapidly after the final set is reached and seems to depend upon the pH (and temperature). If one batch of cement has been mixed for three hours and fresh cement is added, it requires as long for the whole batch now to reach its final set as for the fresh cement alone. *Zement* (1933) 22, No. 38, p. 523.

Advances in Cement Investigations in 1932. C. L. Platzmann gives his annual review on the researches reported in 1932 on cement, with a bibliography of 117 references. The world-wide increase in strength standards has generally spent its force. In regard to scientific investigations, P. feels that Germany is again forging ahead, after the classical work carried out in our country on the constitution and hydration of portland cement. At present, in England and in the United States, more attention is being turned toward practical applications, while the Germans are still quite active in theoretical studies. The question of the constituents of portland cement clinker now having been established to the satisfaction of nearly everyone during the past year, more attention is being given to the unravelling of hydration, setting and hardening problems. The question of the proper grinding of cement remains to be solved. Recent developments in practical cement burning are discussed. *Zement* (1933) 22, No. 36, p. 495; No. 37, p. 509.

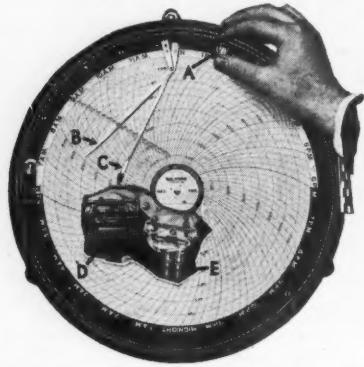
The Hydrothermal Synthesis of Calcium Silicates Under Pressure. S. Nagai has prepared a series of calcium silicates in the autoclave and from these has selected such as have only a small amount of either free lime or free silica. The following compounds have been obtained: CaO.SiO₂. $\frac{1}{4}$ H₂O; 3CaO.2SiO₂.8H₂O; 3CaO, 2SiO₂.H₂O; and 2CaO.SiO₂.H₂O. The octahydrate of the tri-di compound was formed at a lower pressure than the monohydrate. The last compound was found to be Hillebrandite. *Journal of the Society of Chemical Industry of Japan* (1933) 36, No. 7, p. 404b-407b.

New Machinery and Equipment

New Line of Recording Instruments

REACTING to temperatures as low as 40 deg. below zero and up to 1200 deg. F., the new line of the Brown Instrument Co. is available in both 8 in. and 12 in. circular chart units. Pressure and vacuum gauges for ranges from 10" of water up to 5000 lb. are offered.

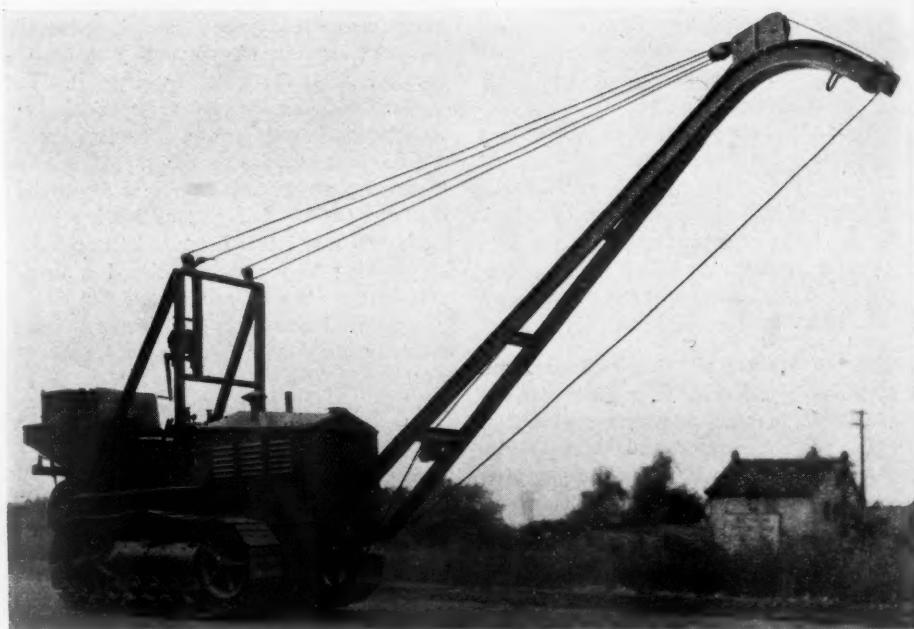
Helix mechanism—Bourdon tubes—are improved in the new line with the gas and vapor type helices made of heat treated phosphor bronze. The mercury-filled helix is



Records and Controls Temperatures up to 1200° F.
(a) Knob for changing setting of B. (b) Index showing temperature at which control is set. (c) Temperature pen. (d) Electric motor selects switch position, depending upon relation of C to B. (e) Mercury in glass switches, capacity 15 amperes at 110 volts, positive in action, are mechanically positioned by motor D. No power required from pen. ~Eliminate relays in most applications.

built of a special stainless steel which stands 100% overload, says the company, and provides a surplus of power to move the pen.

An electric clock is standard at no extra cost on all these models. Where A. C. current is not available, however, hand-wound clocks are furnished.



Tractor mounted with new utility crane

Combination Crane Unit

AVAILABLE for mounting on either the model 20 or model 25 Cletracs, manufactured by the Cleveland Tractor Co., the commercial utility crane is offered for a wide range of work. Designers have attempted to build sturdiness and compactness into this combined crane and winch unit. The boom is of the goose-neck type which makes it possible for the crane to pick up odd-size or odd-proportioned objects when it becomes necessary to reach forward over loads that would interfere with the common types of cranes.

Lifting capacity of the new crane at a distance of 3 ft. from the tractor is rated at 2800 lb.; at 12 ft., 1000 lb. Cable capacity is 900 ft. of $\frac{3}{8}$ in. or 600 ft. of $\frac{1}{2}$ in. cable. Maximum height of the lift is 15 ft. A Cletrac is now enroute to the Antarctic aboard Admiral Byrd's ship, *Jacob Ruppert*.

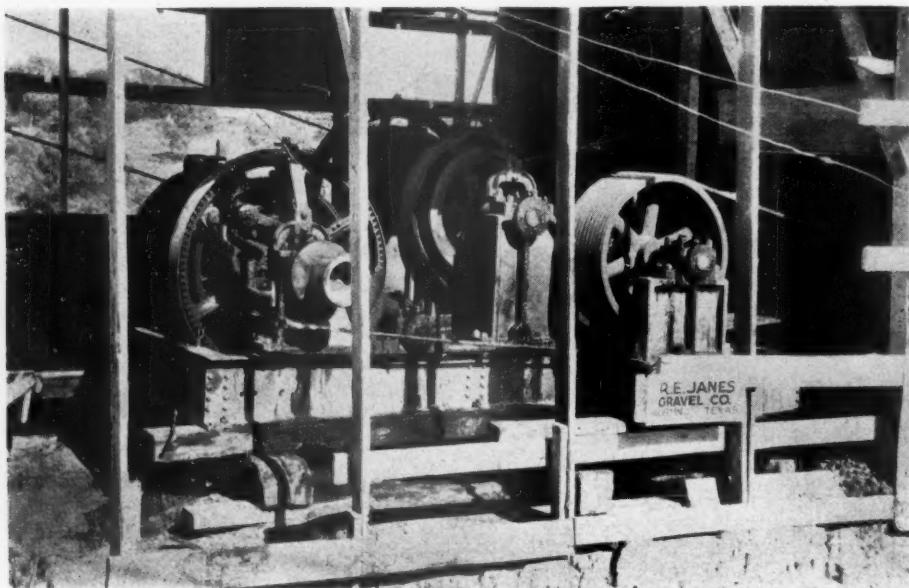
Unit Type Capacitor

MADE FOR ALL voltages up to 4600, the new Ideal line of capacitors is claimed by the manufacturer to have an efficiency of 99 $\frac{3}{4}$ % or better. An outstanding feature is the unit type construction. Each capacitor is an assembly of small, independent hermetically sealed can units. Each unit has been treated and oil impregnated under a vacuum and is provided with sealed fuses.

Heavy-Duty Hoist

ATWO-SPEED electric hoist furnished by the Street Bros. Machine Works to R. E. Janes, Austin, Texas, has several interesting features. Suited for use in dragline, clamshell bucket handling and all around hoisting purposes this unit is equipped with a Worthington Pump and Machinery Corp. V-belt drive and is powered by a 100 hp. General Electric motor.

Strength in the welded frame of this unit is supplemented by ferro-steel, bronze-bushed drums, forged steel hand levers and steel ratchets and dogs. The external band type of clutch and brake is used with lining of asbestos molded block; clutches are operated by screw and yoke.



Hoist unit with V-belt drive

Oil Engine Power for Shovels and Draglines

IN LOCALITIES where gasoline taxes have caused a sharp increase in the cost of that fuel, operators of shovels, cranes and draglines are viewing with interest the new Northwest oil engine. It burns the lighter distillates sold in different parts of the country under names such as No. 1 furnace oil, No. 1 engine distillate, No. 1 stove oil, tractor distillate, etc.

It is claimed that the Northwest oil engine is easily operated by anyone with experience in using gasoline engine units. Pressures do not exceed those of a gasoline engine and the usual crank starting is employed.

The slow speed oil engine mentioned is of the heavy duty type. The ignition system and carburetor provides for the metering of fuel accurately and the atomizing of it into the air stream of the four cylinder mechanism.

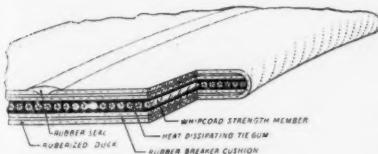
Modification of Railway Type Bearings

THE INDUSTRIAL roller bearing now offered by Fafnir consists of the conventional inner and outer ring and roller cage assembly. The highest grade alloy steel, however, is employed, according to the manufacturers, who state that extra care has been taken in securing steel of high fatigue value, particularly well suited to heavier duty service.

The rolls are said to be of high carbon chrome steel and are hardened throughout; the cage is fabricated from specially form-rolled spacer bar stock with carburized and hardened end rings. Additional capacity is gained, say the company engineers, by increasing the roll length and by using two rows of rollers wherever it is considered necessary.

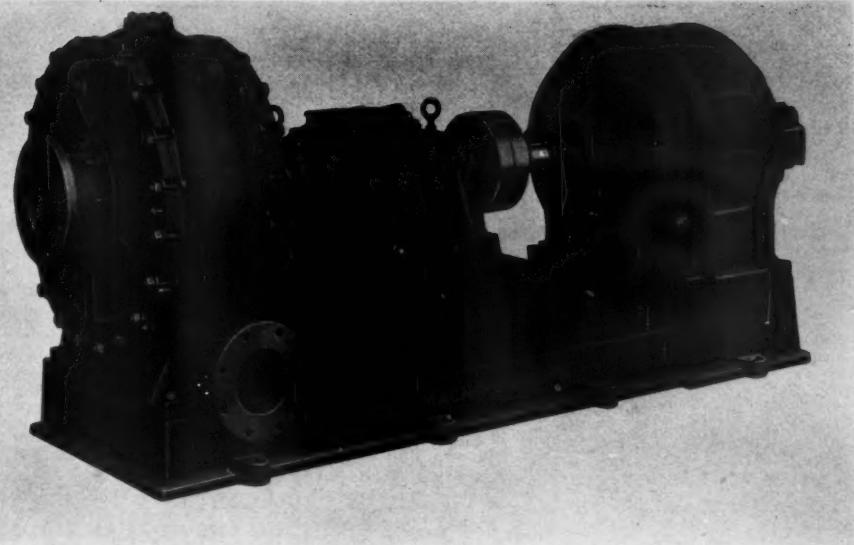
Transmission Belt

THE NEW belt being featured by the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., is of endless-wound whipcord construction. Designed for high speed, high tension drives, it is claimed



Whipcord transmission belt

that the belt has no inelastic stretch. The single layer cord section of this belt (called the "Condor") is the equivalent of six duck plies in strength and is many times more flexible, according to claims of the manufacturer.



Centrifugal pump designed for heavy duty dredging service

Dredging Pump

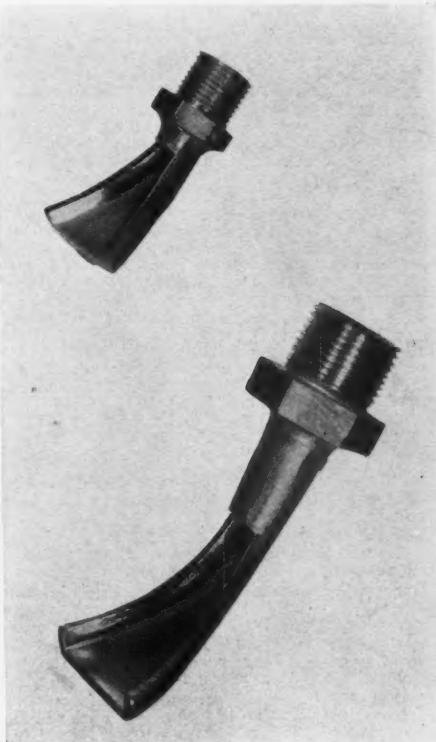
A NEWLY DESIGNED centrifugal pump has been offered by the Morris Machine Works for handling abrasive mixtures against high heads. Semi-steel, manganese steel or special alloys are used in all parts of the type F pump shown here which are subject to wear, such as the casing, impeller, disc, liners, sealing and throat rings. The casing and impeller are of large diameter so that the pump will run at comparatively low speed even when operating against high head.

Position of the impeller may be adjusted from the outside of the pump to take up wear on the suction sealing ring and prevent internal leakage. All parts are substantially proportioned.

These pumps are adapted for handling sand and gravel or for general dredging service when material is to be delivered at high elevation or through long pipe lines. This type of heavy duty dredging pump is available in a range of sizes from 4 in. to 15 in. discharge for total heads up to 150 ft. They may be operated either by belt or motor.

Crushed Stone Sprays

FOR WASHING operations crushed stone and silica sand, the Chain Belt Co. reports a wide use of the Rex spray nozzle. This type of nozzle originally was produced for such operations as the cleaning of debris from baskets of traveling water screens in power plants, etc. A surprisingly low water consumption, in the opinion of the manufacturer, is obtained by the design of this nozzle in which a round stream hits a curved deflector plate with retaining sides. This results in a flat spray free from mist, with a real "knife edge" of water powerfully directed toward the crushed stone or other material to be cleaned of foreign material.



Spray nozzles for crushed stone and silica sand

Line of Turbine-Gear Sets Offered

A MODERN LINE of close-coupled, turbine-gear sets is announced by the General Electric Co. Each set consists of a steam turbine and speed reducing gear designed particularly for driving centrifugal pumps, fans and other low-speed units.

Turbine housings and gear are bolted together to form a single structure supported on the base of the turbine which can be arranged to operate at steam pressures up to 400 lb., temperatures up to 750 deg. F. and back pressure up to 40 lb. gauge, announcements say.



THE INDUSTRY

New Incorporations

Y-W Sand Co., Muskogee, Okla. W. S. Dills and H. E. West are the incorporators.

Mosaic Sand and Gravel Co., Wilkes-Barre, Penn., has been granted a charter and is being capitalized at \$2,500.

Ohio Valley Concrete Pipe Co., Reading, Ohio, \$50,000. James G. Kyle, Herman A. Bayless and John S. Bachman are the incorporators.

Pyramid Concrete Products Co., Beaumont, Tex. Capital stock \$25,000. Incorporators are W. B. Landes, A. H. Hanna and L. P. Brents.

Princess Anne Sand Corp., Diamond Springs, Va. To deal in sand and gravel. Capital \$15,000. Jos. R. Baker, Norfolk, Va., is president.

Western Rock Asphalt Co., Kansas City, Mo. Capitalization \$100,000. Incorporators: James W. Hall and E. H. Leo Thompson located in the Graphic Arts Building.

Marion Mica Co., Marion, N. C. Capital \$100,000. Will engage in grinding mica. W. K. M. Gilkey, Jr., president; T. Brown, vice-president, and Mrs. H. K. Gilkey is secretary-treasurer.

Titan Gypsum Corp., New York, N. Y. 50 shares pfd., 100 shares com. n. p. v. To deal in building materials. Incorporators are: Harold W. Hayman, Louis C. Hoyt, Selig Birenbach, all of 100 Williams Street.

Personals

B. L. Prater succeeds the late Ira Pierce as superintendent of the Modern Sand and Gravel Co., Pacific, Mo.

James R. Paul, sales manager of the Alpha Portland Cement Co., has been made a colonel on the staff of Kentucky's Governor Ruby Laffoon.

C. H. Shaver, former assistant controller of the United States Gypsum Co., has been elected secretary-treasurer to succeed the late R. G. Bear.

C. S. Branscomb, chemist of the Volunteer Portland Cement Corp., recently addressed the Chamber of Commerce at Knoxville, Tenn., on cement manufacture.

George Mattison, vice president and general manager of the Woodstock Slag Co., has been elected vice commander of American Legion post No. 1 at Birmingham, Ala.

Edwin C. Eckel, consulting engineer and specialist in the cement, lime and gypsum industries, Washington, D. C., has been appointed geologist of the Tennessee Valley Authority, with office at Knoxville, Tenn.

L. M. McDonald, superintendent of the Canada Cement Co. plant, Port Colborne, Ont., recently conducted a party of 50 students from the department of applied science in Toronto University through the plant.

Frank C. Mooney has been named secretary of the Wolverine Portland Cement Co., Coldwater, Mich., to succeed the late Patrick H. Sweeney. Mrs. Flora Root, formerly assistant secretary and treasurer, has been made treasurer.

P. F. Balfour, formerly chief chemist and engineer for the Missouri Portland Cement Co., recently resigned that position to leave on January 1 for Sao Paulo, Brazil, S. A., to become managing engineer of the Brazilian Portland Cement Co.'s plant there.

Obituaries

William N. Hoag, 72, president of the Strasburg Lime Co., Strasburg, Va., died recently.

Manuel P. Martin, head of Martin Bros. Sand and Gravel Co., Santa Clara, Calif., died recently.

Dorsey Ridenour, 41, of Glenford, Ohio, superintendent of the Silica Sand Co. at Glass-rock, died recently.

Walter N. Damm, 42, for seven years owner and operator of a rock quarry at Neelys Landing, Mo., died recently.

James F. Cohig, 37, plant superintendent of the Georgia Kaolin Co., Dry Branch, Georgia, died November 8.

Charles R. Stager, 49, a master mechanic of the Marquette Cement Mfg. Co. plant, Cape Girardeau, Mo., died recently.

Ira Pierce, superintendent of the Modern

Sand and Gravel Co., Pacific, Mo., was shot and killed recently by a former employee.

Harry R. Wheeler, 72, for 25 years engineer for the Henry Steers Sand and Gravel Co., Northport, L. I., died October 29.

William T. Elkinton, 73, philanthropist and chairman of the board of the Philadelphia Quartz Co., Philadelphia, Penn., died October 25.

James Thomas Phillips, 46, superintendent of the Central Sand and Gravel Co.'s dredge operation, died November 3 at Memphis, Tenn., from a heart ailment.

A. Miles Barr, 67, assistant secretary of the American Lime and Stone Co. which he has been connected with since 1918 died at his home in Bellefonte, Penn., Nov. 1, following a stroke of paralysis.

Harry C. Trexler, 79, chairman of the board of the Lehigh Portland Cement Co. and banker of Allentown, Penn., died in a hospital at Easton, Nov. 17, as a result of injuries sustained in an automobile accident. Owner of 7,000 acres of Lehigh county land, General Trexler was known as one of the pioneers in the development of the Lehigh region.

Holger Struckmann, president of the International Cement Corp., died this month in Copenhagen as he was about to return from an extensive trip of inspection to various foreign plants of his company. The body is expected in New York by December 5. The Struckmann home is in Rye, N. Y. Born in Denmark in 1878, Mr. Struckmann came to this country in 1902 and allied himself at once with the cement industry. In 1917 he became connected with the International Portland Cement Corp., now the International Cement Corp. He was a member of the Royal Danish Yacht Club as well as several business and professional organizations such as the Society of Mechanical Engineers and the Society of Civil Engineers.

Cement

Universal Atlas Cement Co., plant at Hudson, N. Y., closed temporarily in November.

Oregon-Portland Cement Co., plant at Oswego, Ore., closed down temporarily November 1.

Bamberton Cement Works, Victoria, B. C., is operating on a winter schedule with 75 men.

Kelley Island Lime and Transport Co. is dismantling the old Ohlemacher lime kilns at Sandusky, Ohio.

South Dakota State Cement Plant, Rapid City, S. D., anticipates steady running time up until about December 15.

Spokane Portland Cement Co. recently reopened its Irvin, Wash., plant after an 11 month shutdown, with 60 men instead of the pre-NRA 50.

Consolidated Cement Corp., Fredonia, Kan., has resumed production with 60 to 70 men on a schedule which calls for steady running until about the first of the year.

Olympic Portland Cement Co., Bellingham, Wash., is operating its limestone quarry. General operations in the cement mill proper are limited to the finish grinding department.

Oregon Portland Cement Co., plant at Lime, Ore., reopened November 1 with 80 men instead of the pre-NRA quota of 55. At least four months operation of a 24-hour schedule is anticipated.

Universal Atlas Cement plant at Independence, Kan., which has been shut down temporarily to make repairs to plant equipment will reopen this month and approximately 125 men will go back to work.

Huron Portland Cement Co., Oswego, N. Y., completed machinery installation this month for the new cement storage plant which is to receive approximately 70,000 bbl. of cement from the Alpena, Mich., plant before December 1.

Federal Portland Cement Co., Buffalo, N. Y., reports that about 125 men will be employed in its Bay View plant when operations started the last week in October increase to full capacity. Operation for the balance of the year is anticipated.

Santa Cruz Portland Cement Co., Santa Cruz, Calif., reports progressive increases in the U. S. Government orders for its product from 350,000 bbl. to 580,000. The price is \$2.00 per bbl. With 175 men on the mill payroll and 30 more working in the mill quarry the plant is on a 24-hour schedule with four shifts. Part of the cement is be-

ing shipped to Panama and the balance is being used on California projects.

Quarries

Cass County Quarries are being reopened near Plattsmouth, Neb.

Hayes Quarry, Bethany, Mo., reports recent plant modernization.

Milwaukee Railroad Quarry near Alder, Wash., has been reopened.

County Crushing Operations have been resumed near Grace Hill, Ia.

Consolidated Sand Co. has reopened the Spencer stone quarry, Spencer, Ia.

Rafdal Co., Northfield, Minn., is moving new machinery into the Jaeger quarry, near Faribault.

Travertine Rock Quarries near Wellsville, Colo., have reopened to fill an order for 30,000 ft. of rock.

Atlas Rock Co., Oakdale, Calif., reports a complete remodeling of its plant to care for recent orders.

Columbia Contract Co., Fisher, Wash., has resumed operations in supplying rock for the Columbia river jetty.

Douds Quarry, Cantril, Ia., has maintained some activity lately despite the working of the prison quarry at Croton.

Great Lakes Dredge and Dock Co., Ashland, Ohio, has purchased four 133 ft. steel barges for transporting breakwater rock.

Federal Government Forces have resumed operation at the West Sioux quarry, Sioux Falls, S. D. Eventually 100 men will be employed.

County Rock Quarry and Crusher on the Helm farm near Wright, Ia., has been opened as an emergency relief project. Rock will be used for highway work.

Kansas City Material Co., operating stone quarries in Jackson county, Mo., has been placed in involuntary bankruptcy by order of Judge Merrill E. Otis of the Federal court, Kansas City.

Quarry Workers from Clay Center, Genoa, Gibsonburg and Woodville, Ohio, recently paraded in Genoa, preceding their meeting at which a band played and the union proposition was explained.

Rock Crusher has been purchased by Richmond, Kan., city officials to be used to crush large piles of rock to be used on streets here. The crusher will be paid for by property owners along the streets rocked.

Lime

Western Lime and Chemical Co., Fort Towson, Okla., recently closed its plant in order to increase capacity by the installation of two new engines, one on a grinder and the other on a hoist.

Sand and Gravel

Reitz and Crites are opening a new gravel pit at Hermosa, S. D.

Mandelkow Gravel Pit is being stripped for operations near Struble, Ia.

Kansas Gravel Pits have been reopened at several points in Osborne county.

Myers Gravel Pit near Menlo, Ia., is being worked in connection with local highway construction.

Walker Gravel Pit, Northwood, Ia., was scheduled for operation by county forces, beginning October 20.

LeGrand Limestone Co., recently awarded paving contract, is building a new plant on property near Rock Rapids, Ia.

Concho Gravel Co. is moving gravel plant machinery into Walters, Okla., for its new local branch which soon will be established.

Nolan Bros. are working their gravel and rock pit property near Guttenberg, Ia. Washed sand and gravel are being delivered on local paving projects.

J. K. Davison and Brothers, Pittsburgh, Penn., have been awarded a 15,000 ton crushed gravel order. The product will be dredged from the Allegheny river.

Winona Sand and Gravel Co., Winona, Minn., has been awarded a contract to furnish 60,000 tons of sand and gravel for the Whitman dam. Shipments at the rate of about 10 cars a day was begun in November. Amount involved in the contract is thought to be approximately \$50,000.

County Commissioners, Enterprise, Ohio, have placed a new gravel pit in operation. Equipment costs of \$2700 are being refunded according to November reports by operating savings estimated at over \$500 a week. Before the equipment was installed the gravel cost was rated at \$1.35 per cu. yd. It now is being produced at 68c per cu. yd., according to the commissioner.

Cement Products

Malone Concrete Products Co., Malone, N. Y., started work in November on a large pipe contract.

Camden Cement Products Co., Camden, Ohio, has reopened for a steady run of three or four months.

North Bonneville Construction Co., Moffett, Wash., has started a concrete block manufacturing project.

Manson Construction Co., Seattle, Wash., has been awarded contract for two large international concrete boundary markers.

John Thurman has purchased a one-fourth interest in the Smith and Sanders Earthquake Building Block Co., Visalia, Calif.

Universal Concrete Pipe Co., Columbus, Ohio, has been awarded a \$153,000 contract by the city of Springfield, Ohio, in connection with the public works program approved by the government.

Joe I. Hays Construction Co., Jackson, Tenn., is producing 1,500,000 tetrahedral concrete blocks for federal river revetment work. More than 200,000 blocks already have been manufactured.

Miscellaneous

Northwest Magnesite Co., Chewelah, Wash., will continue operations at least until January 1.

Phosphate rock mine at Conda, Idaho, reopened and 50 families, former residents of the town, have moved back.

W. T. Hackney and Co. has opened a phosphate mine near College Grove, Tenn. A year's operation is scheduled.

Dawes Construction Co. asphalt plant on the Ochlocknee river was put in actual operation this month. The company's product is a mixture of sand crushed rock, asphalt and other materials.

Manufacturers

Traylor Engineering and Manufacturing Co., Allentown, Penn., with district offices in New York, Chicago, Los Angeles and Seattle, announces the opening of a new district office at Little Rock, Ark., to serve western Tennessee, Arkansas, Louisiana, Texas, Oklahoma and Kansas. B. W. Traylor is in charge of the new office. He has been connected with the company for many years and is well acquainted with the many lines of crushing cement, lime, mining and metallurgical machinery manufactured by the company.

B. W. Traylor



Rockwood Manufacturing Co., Indianapolis, Ind., announces the new Rockwood vertical drive motor base and the Rockwood ceiling drive motor base. They are being merchandised by leather belt makers and several motor manufacturers.

Acheson Oildag Co., Port Huron, Mich., announces a recent increase of five per cent in all salaries to employees.

Yale and Towne Manufacturing Co., New York, N. Y., announces the purchase of plant and goodwill of the Walker Vehicle Co. and the Automatic Transportation Co., Chicago.

Goodyear Tire and Rubber Co., Akron, Ohio, has its \$500,000 modernization program well under way. The new power plant is the largest single project undertaken by the company in its current building program.

Sksaw, Inc., Chicago, Ill., announces an improved belt sander with vacuum dust collector attached. The dust collector attachment can be fitted to old machines as well as to the new models.

Hercules Powder Co., Inc., Wilmington, Del., announces that because of the shortened hours under recovery regulations approximately 400 additional men will be given employment at Hercules plants throughout the country.

Foote Bros. Gear and Machine Co., Chicago, Ill., has appointed E. Akridge as sales engineer for the northwestern area of Chicago. For similar duties in the southwest Chicago area, the company has appointed George E. Poplar, formerly with Hildebrand Engineering Co. and the Industrial Engineering Co.

Ohio Power Shovel Co., Lima, Ohio, announces the installation of a new Lima shovel at the plant of the John W. Karch Stone Co., Celina, Ohio. The new machine is a one-yard unit, chain crowd, outside dipper handle and roller bearings.

Louis Allis Co., Milwaukee, Wis., has appointed C. F. Cate as representative for the state of New Mexico; Robert B. Soderberg for Connecticut; N. O. Lawyer as salesman in the New York office; G. W. Conner as a member of the Cincinnati office organization.

Productive Equipment Corp., Chicago, Ill., recently placed three more of its "Jigger" screens with the Diamond Alkali Co. It is also announced that the Barrett Co., New York, N. Y., has bought this company's vibrating screen equipment for another of its plants.

Combustion Engineering Co., New York, N. Y., has appointed James Cleary as manager of the Philadelphia sales office. Fred L. Farrell has been made manager of the New England sales territory, and Mr. G. O. French has been engaged as special sales engineer.

General Electric Co., Schenectady, N. Y., announces that part of its display in the "House of Magic" at the recent "Century of Progress" in Chicago will be used as part of its exhibit at the 14th Exposition of Chemical Industries in New York, December 4 to 9.

Cleveland Tractor Co., Cleveland, Ohio, has furnished one of the company's tractor units for use of Admiral Byrd now enroute to the South Polar regions on the Steamer Jacob Ruppert. The tractor was put on shipboard at Norfolk, Va., and will be unloaded in Little America for hauling supplies, etc.

Raymond Bros. Impact Pulverizer Co., Chicago, Ill., announces the organization of a Metallurgical Division for supplying a full line of coal pulverizing, transporting and burning equipment for complete powdered fuel installations in the steel, malleable iron and allied industries. C. F. Herington is manager. In the past 17 years he has designed and placed in operation pulverized coal plants on metallurgical furnaces of all types.

Carbide and Carbon Chemicals Corp., subsidiary of the Union Carbide and Carbon Corp., New York, N. Y., on December 9 will receive a bronze plaque engraved with notice of award for outstanding chemical achievement. The award sponsored by *Chemical and Metallurgical Engineering* is said to be the first award of its kind to be given to a company rather than to an individual. The development of synthetic organic chemicals which make the United States independent of foreign sources is one of the achievements cited by the committee in charge of the award.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has granted licenses to 16 companies for the manufacture of Texrope drives: American Pulley Co., Dayton Rubber Manufacturing Co., R. and J. Dick Co., Inc., Dodge Manufacturing Co., L. H. Gilmer Co., Goldens' Foundry and Machine Co., B. F. Goodrich Co., Goodyear Tire and Rubber Co., Inc., W. A. Jones Foundry and Machine Co., Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., Medart Co., Ohio Valley Pulley Works, Pyott Foundry and Machine Co., Rockwood Manufacturing Co., T. B. Wood's Sons Co. and the Worthington Pump and Machinery Corp.

Trade Literature

Compressors. Eight-page illustrated folder on portable compressor units shown with all possible mountings. **WORTHINGTON PUMP AND MACHINERY CORP.**, Harrison, N. J.

Oilers. Eight-page leaflet diagrams and describes operation of the constant level oiler for bearings. **SPEEDWAY MANUFACTURING CO.**, Cicero, Ill.

Motors. Comprehensive chart shows 29 different types of electric motors with the proper kind of motor indicated for about 50 different applications. **LOUIS ALLIS CO.**, Milwaukee, Wis.

General. Newspaper format employed for listing machinery stock and equipment of interest to chemical and allied industries. **CONSOLIDATED PRODUCTS CO., INC.**, New York, N. Y.

Tires. Advantageous effect of properly designed rubber tires for industrial hand and power trucks on plant floors and runways outlined in four-page leaflet. **B. F. GOODRICH CO.**, Akron, Ohio.

Recording Instruments. New 12-page illustrated folder describes recording CO₂ meter device. Dollar savings through control by means of this device explained. **BROWN INSTRUMENT CO.**, Philadelphia, Penn.

Motor Generators. Bulletin 1056 contains complete description of a modern shunt inductor welder motor-generator set. Bulletin 1057 on arc welding accessories and clothing is supplementary. **UNIVERSAL POWER CORP.**, Cleveland, Ohio.

Tractors. Special, detailed information, on controlled alignment of tractor track. Miscellaneous information and a final chapter on a front end shovel. A 12-page unit of the loose leaf series. **ALLIS-CHALMERS MANUFACTURING CO.**, Milwaukee, Wis.

Steel. A large and evidently complete stock list running to more than 200 pages includes comprehensive information on all kinds of steel including all special grades of cold finished steels, alloy steels, stainless steels and also brass, copper and other non-ferrous metals. **JOSEPH T. RYERSON AND SON, INC.**, Chicago, Ill.

Motor Trucks. Substantial 66-page booklet outlines use of aluminum motor truck bodies for various operations. Reported savings in its use by handlers of aggregates among case histories cited. Supplement contains drawings and specifications for six types of truck bodies. **ALUMINUM CO. OF AMERICA**, Pittsburgh, Penn.

Gravel Treatment. Volume 3 in series of booklets entitled, "The Story of the Hoover (Boulder) Dam," contains 48 profusely illustrated pages outlining operations on this project. The railroad system in use, the gravel-treating and concrete-mixing plant and the lining of the diversion tunnels with concrete are special features of this third volume. **INGERSOLL-RAND CO.**, New York, N. Y.

Pumps. Bulletin 149 has 16 illustrated pages full of information on side suction-volute pumps, recent improvement explained. Sectional drawings show motor and belt driven horizontal designs and also vertical units for operation in wet pit and dry sump. Various drive types illustrated. Complete rating tables given for pumps driven by belt, motor and steam engine. **MORRIS MACHINE WORKS**, Baldwinsville, N. Y.

Recording Instruments. Catalog No. 6702 offers an 80-page summary of all standard and recently improved thermometers and pressure gauges which the company has designed for indicating, recording and controlling service. Full specifications. Technical outline of the universal case, electric chart drive, automatic pen release, combination door handle and lock, etc., and toggle switch for chart drive. **BROWN INSTRUMENT CO.**, Philadelphia, Penn.

Pipe and Tubing. Bulletin arranges in best form all technical facts on the Diescher process as applied to pipe and tubing. Notes made of uniform wall thickness and scratch-free finish of tubes properly made. **BABCOCK AND WILCOX CO.**, New York, N. Y.

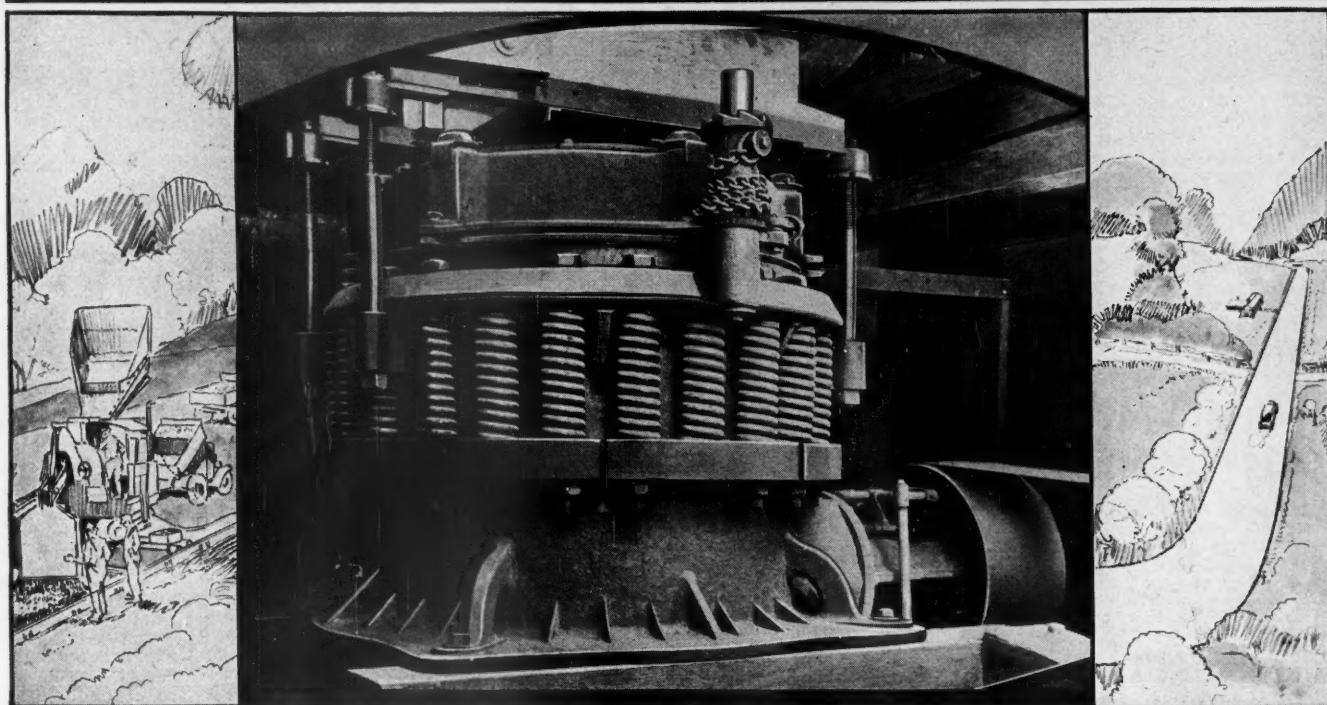
Dust Collectors. Eight-page illustrated folder gives specifications for latest dust collector models. Charts included showing dimensions and cloth area for various sizes of dust collecting units. **PANGBORN CORP.**, Hagerstown, Md.

Free Lime in Portland Cement from Heating

EXPERIMENTS on the rate of liberation of lime from portland cement are described by G. E. Bessey, of the Building Research Station, in *Cement and Cement Manufacture*, London, England.

The glycerol-ammonium acetate method of estimating free lime was used and the heating was done in electric tube furnaces. The results of these experiments indicated that tricalcium silicate in cements is unstable below 1350 deg. C. but that its decomposition only takes place with any rapidity above 1050 deg. C. when heated alone and above 600 deg. C. in the presence of catalysts such as free lime and gypsum.

Producing Fine Material for Roads and — at a Lower Crushing Cost, too!



An installation of a three-foot Symons Cone Crusher in the Pacific Northwest, used exclusively for the production of finely crushed road materials.

*For ordinary sizes use a
STANDARD SYMONS CONE
while for still finer crushing use the
NEW SHORT HEAD CONE*

Standard Crushers are built in 2, 3, 4, 5½ and 7 foot sizes; the Short Head in 3, 4, 5½ and 7. One of these will surely solve that fine crushing problem of yours.

With the big road program now under way, there is going to be an unusual demand for finer sizes of crushed materials, particularly for "black-top" and similarly surfaced roads. Plants that were not designed to produce such sizes are going to be handicapped, both in ability to make delivery in the quantity needed and at a cost that will return a reasonable profit. The two types of Symons Cone Crushers now available will produce just the sizes needed. When installed in existing plants, they eliminate the expensive operations of producing such sizes for which there is little demand; also needless stock-piling and rehandling. Produce the sizes you want, when you want them, with a Symons Cone.

NORDBERG MFG. CO.

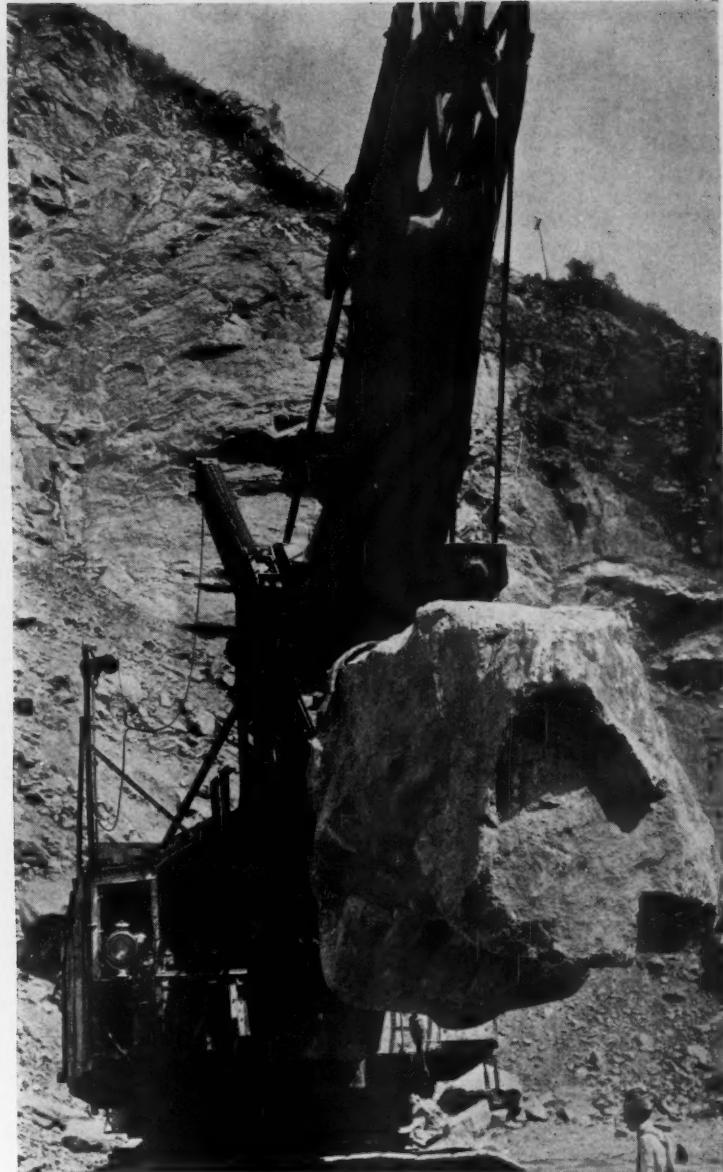
NEW YORK CITY
60 East 42nd St.

LONDON, W.C. 2
Bush House

MILWAUKEE,
WISCONSIN

LOS ANGELES, CALIF.
Subway Terminal Bldg.

Insure your profits *with* **BALANCED VALUE**

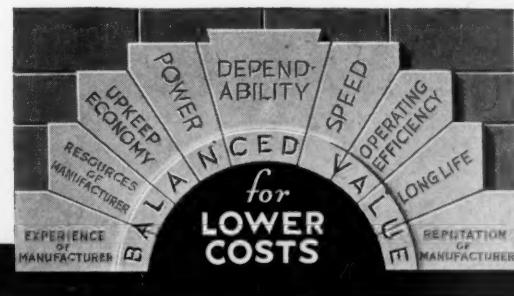


IF you operate an obsolete machine today, you are sacrificing up-to-date speed and ease of operation, you're gambling with expensive breakdown delays, and probably paying high upkeep and repair bills . . . in short, sacrificing your chance to make a profit.

You need an excavator that will enable you to get business, give you consistently high output, dig at the lowest possible cost per yard. Meet the new N.R.A. conditions with a modern machine selected for balanced value.

BUCYRUS-ERIE CO., South Milwaukee, Wisconsin

*See **BUCYRUS
ERIE** before you buy!*



Recognized the World Over as the Leader in Its Field

Rock Products

With which is
Incorporated **CEMENT and ENGINEERING
NEWS** Founded
1896

Entered as second-class matter, February 4, 1933, at the Chicago, Ill., postoffice under
the Act of March 3, 1879. Copyrighted, 1933, by TradePress Publishing Corporation

December 25, 1933

TABLE OF CONTENTS

Recovery Progress—Trends.....	17-20
Measure of Damages for Failure to Deliver Crushed Stone According to Contracts.....	21
By Leslie Childs	
Movie Studios Surround Sand and Gravel Plant... Provide New Market. By A. B. Laing	22
Rip-Rap for a Breakwater.....	23
West Coast Crushed Stone Producer Turns Quarrying Experience Into Profit. By Walter B. Lenhart	
The Silicosis Problem and the Quarryman.....	24-29
By C. H. Vivian	
Viscosity of Cement Slurry.....	30-33
Effect of Water Content, Temperature, Storage, Fineness and Lime Content Upon Viscosity of Slurry. By Katsuzo Koyanagi	
Cement Industry's Code Now Law.....	44-50
Provides for Allocation of Available Business; Control of New Productive Facilities; Amortization of Obsolete Plants.	
Belt Conveyor Theory and Practice.....	51-52
Part IV—Belt Conveyor Analysis. By G. F. Dodge, M. E.	

Departments

Chemists' Corner	30-33
Hints and Helps for Superintendents.....	34-35
Editorial	37
Financial News and Comment.....	38-39
Traffic and Transportation.....	40-41
Digest of Foreign Literature.....	42-43
Cement Products	54-55
New Machinery and Equipment.....	56-57
The Industry	59-60
Classified Directory of Advertisers.....	64, 66

Telephone
Harrison 1422-23

TRADEPRESS PUBLISHING CORPORATION
330 South Wells Street, Chicago, Illinois, U. S. A.

NATHAN C. ROCKWOOD, President; I. H. CALLENDER, Vice-President and Treasurer
T. L. McKNIGHT, Secretary

NATHAN C. ROCKWOOD, Editor

H. K. FERGUSON, Associate Editor

DR. F. O. ANDERECK, Pittsburgh, Penn., Contributing Editor

EDMUND SHAW, Los Angeles, Calif., Contributing Editor

WALTER B. LENHART, Special Editorial Representative

SUBSCRIPTION—Two dollars a year to United States and Possessions. \$4.25 a year to Canada (including duty) and \$4.00 to foreign countries. Twenty-five cents for single copies



The A. B. P. is a nonprofit organization whose members have pledged themselves to a working code of practice in which the interests of the men of American industry, trade and professions are placed first—a code demanding unbiased editorial pages, classified and verified paid subscribers, and honest advertising of dependable products. The A.B.C. is an organization which audits and verifies publishers' circulation claims and records.

LOUIS A. KOCH, Business Manager
JOS. J. KOLAR, Production
FRED S. PETERS, Eastern Representative
450 Seventh Ave., New York City. Tel. Lack. 4-6857
L. C. THAON, Western Representative
Chicago. Tel. Harrison 1422

F. B. SHONDELL, Central Representative
2238 Glenwood Ave., Toledo, Ohio

TO SUBSCRIBERS—Date on wrapper indicates issue with which your subscription expires. In writing, to have address changed, give old as well as new address